United States
Department of
Agriculture

Natural
Resources
Conservation
Service

In cooperation with
the Ohio Department of
Natural Resources,
Division of Soil and Water
Conservation; Ohio
Agricultural Research and
Development Center; and
Ohio State University
Extension

Soil Survey of Muskingum County, Ohio

How To Use This Soil Survey

General Soil Map

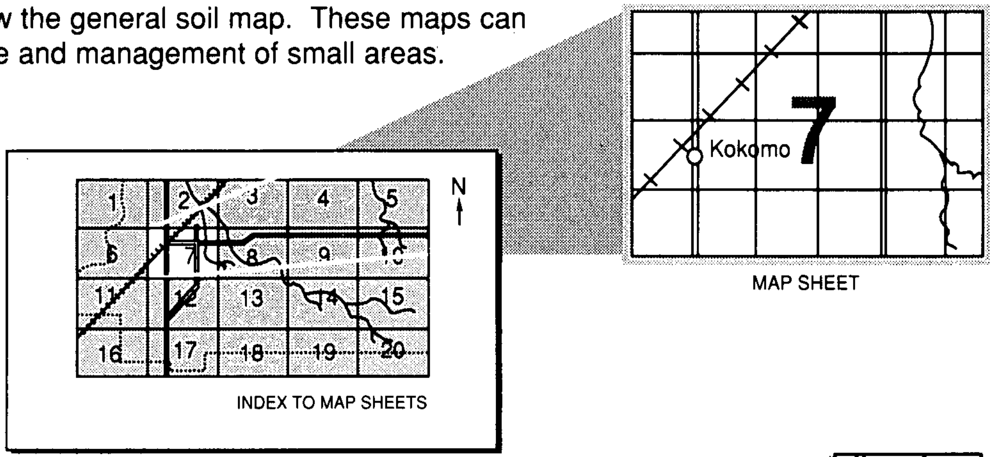
The general soil map, which is the color map preceding the detailed soil maps, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

To find information about your area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.

Detailed Soil Maps

The detailed soil maps follow the general soil map. These maps can be useful in planning the use and management of small areas.

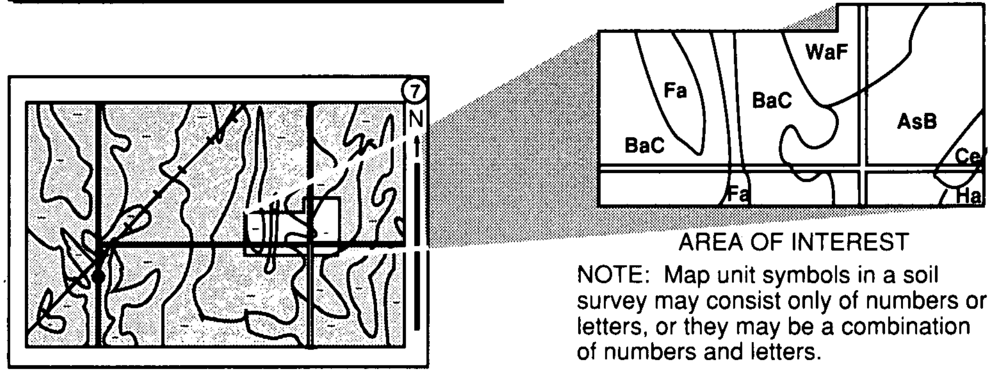
To find information about your area of interest, locate that area on the **Index to Map Sheets**, which precedes the soil maps. Note the number of the map sheet, and turn to that sheet.



INDEX TO MAP SHEETS

MAP SHEET

Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. Turn to the **Index to Map Units** (see Contents), which lists the map units by symbol and name and shows the page where each map unit is described.



MAP SHEET

AREA OF INTEREST

NOTE: Map unit symbols in a soil survey may consist only of numbers or letters, or they may be a combination of numbers and letters.

The **Summary of Tables** shows which table has data on a specific land use for each detailed soil map unit. See **Contents** for sections of this publication that may address your specific needs.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (formerly the Soil Conservation Service) has leadership for the Federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1987. Soil names and descriptions were approved in 1988. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1987. This survey was made cooperatively by the Natural Resources Conservation Service and the Ohio Department of Natural Resources, Division of Soil and Water Conservation; the Ohio Agricultural Research and Development Center; and Ohio State University Extension. Funds were provided by the Muskingum County Commissioners. The survey is part of the technical assistance furnished to the Muskingum Soil and Water Conservation District.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

All programs and services of the Natural Resources Conservation Service are offered on a nondiscriminatory basis, without regard to race, color, national origin, religion, sex, age, marital status, or handicap.

Cover: These contour strips of hay and corn on Keene soils slow runoff and help to control erosion.

Contents

Index to map units ... v
Summary of tables ... viii
Foreword ... xi
General nature of the county ... 2
How this survey was made ... 4
  Map unit composition ... 6
  Survey procedures ... 6
General soil map units ... 9
  Soil descriptions ... 9
Detailed soil map units ... 19
  Soil descriptions ... 19
Prime farmland ... 125
Use and management of the soils ... 127
  Crops and pasture ... 127
  Woodland management and productivity ... 133
  Windbreaks and environmental plantings ... 137
  Recreation ... 137
  Wildlife habitat ... 138
  Engineering ... 139
Soil properties ... 145
  Engineering index properties ... 145
  Physical and chemical properties ... 146
  Soil and water features ... 147
  Physical and chemical analyses of selected soils ... 149
  Engineering index test data ... 149
Classification of the soils ... 151
Soil series and their morphology ... 151
  Aaron series ... 151
  Alford series ... 152
  Berks series ... 153
  Bethesda series ... 153
  Brookside series ... 154
  Chagrin series ... 155
  Chavies series ... 156
  Chili series ... 156
  Cidermill series ... 157
  Cincinnati series ... 158
  Clarksburg series ... 159
  Claysville series ... 160
  Coshocton series ... 161
  Fairpoint series ... 161
  Fitchville series ... 162
  Frankstown Variant ... 163
  Gilpin series ... 163
  Glenford series ... 164
  Guernsey series ... 165
  Homewood series ... 166
  Jimtown series ... 167
  Keene series ... 167
  Killbuck series ... 168
  Lakin series ... 169
  Lindside series ... 170
  Lobdell series ... 170
  Lorain series ... 171
  Lowell series ... 171
  Luray series ... 172
  Markland series ... 173
  McGary series ... 174
  Melvin series ... 174
  Mertz series ... 175
  Morristown series ... 176
  Newark series ... 176
  Nolin series ... 177
  Omulga series ... 178
  Rawson series ... 179
  Rigley series ... 179
  Rodman series ... 180
  Sebring series ... 181
  Stonelick series ... 182
  Tioga series ... 182
  Upshur series ... 183
  Watertown series ... 183
  Wellston series ... 184
  Westgate series ... 185
  Westmoreland series ... 186
  Zanesville series ... 187
Formation of the soils ... 189

Factors of soil formation 189
Processes of soil formation 191
References 193
Glossary 197
Tables 207
Interpretive groups 337

Issued June 1996

Index to Map Units

AaB—Aaron silt loam, 2 to 8 percent slopes 19
AaC2—Aaron silt loam, 8 to 15 percent slopes, eroded 20
AaD2—Aaron silt loam, 15 to 25 percent slopes, eroded 21
AcB—Aaron-Upshur complex, 2 to 6 percent slopes 23
AfB—Alford silt loam, 2 to 8 percent slopes 24
AfC2—Alford silt loam, 8 to 15 percent slopes, eroded 25
BeB—Berks channery silt loam, 2 to 8 percent slopes 25
BeD2—Berks channery silt loam, 15 to 25 percent slopes, eroded 26
BeE—Berks channery silt loam, 25 to 40 percent slopes 27
BkF—Berks-Westmoreland complex, 40 to 70 percent slopes 28
BoB—Bethesda shaly silt loam, 1 to 15 percent slopes 29
BoD—Bethesda shaly silt loam, 15 to 25 percent slopes 29
BpF—Bethesda flaggy silt loam, 25 to 70 percent slopes 30
BsC2—Brookside silty clay loam, 8 to 15 percent slopes, eroded 31
BsE—Brookside silty clay loam, 15 to 40 percent slopes 32
Cb—Chagrin loam, rarely flooded 32
CcA—Chavies loam, 0 to 2 percent slopes 33
CcB—Chavies loam, 2 to 6 percent slopes 34
CeA—Chili loam, 0 to 3 percent slopes 34
CeB—Chili loam, 3 to 8 percent slopes 36
ChA—Chili gravelly loam, 0 to 3 percent slopes 36
ChB—Chili gravelly loam, 3 to 8 percent slopes 37
ChC—Chili gravelly loam, 8 to 15 percent slopes 37
CkA—Cidermill silt loam, 0 to 3 percent slopes 38
CnB—Cincinnati silt loam, 2 to 6 percent slopes 39
CnC2—Cincinnati silt loam, 6 to 15 percent slopes, eroded 40
CpC2—Clarksburg silt loam, 8 to 15 percent slopes, eroded 41
CrC—Claysville-Guernsey silty clay loams, 8 to 15 percent slopes 42
CsC2—Coshocton silt loam, 8 to 15 percent slopes, eroded 44
CsD—Coshocton silt loam, 15 to 25 percent slopes 46
CtE—Coshocton-Westmoreland silt loams, 25 to 40 percent slopes 47
Ds—Dumps and Pits, mine 48
FaB—Fairpoint silty clay loam, 1 to 15 percent slopes 48
FaD—Fairpoint silty clay loam, 15 to 25 percent slopes 50
FaE—Fairpoint silty clay loam, 25 to 50 percent slopes 52
FbF—Fairpoint channery silty clay loam, 25 to 70 percent slopes 53
FcA—Fitchville silt loam, 0 to 2 percent slopes 53
FcB—Fitchville silt loam, 2 to 6 percent slopes 54
FkB—Frankstown Variant-Mertz complex, 3 to 8 percent slopes 56
GdB—Gilpin silt loam, 2 to 8 percent slopes 58
GdC2—Gilpin silt loam, 8 to 15 percent slopes, eroded 58
GeD2—Gilpin-Upshur complex, 15 to 25 percent slopes, eroded 59
GeE2—Gilpin-Upshur complex, 25 to 40 percent slopes, eroded 60
GfA—Glenford silt loam, 0 to 2 percent slopes 61
GfB—Glenford silt loam, 2 to 6 percent slopes 62
GfC2—Glenford silt loam, 6 to 15 percent slopes, eroded 63
GtC2—Guernsey-Upshur silty clay loams, 6 to 15 percent slopes, eroded 64
GtD2—Guernsey-Upshur silty clay loams, 15 to 25 percent slopes, eroded 65
HaC2—Homewood silt loam, 8 to 15 percent slopes, eroded 66

HaD2—Homewood silt loam, 15 to 20 percent slopes, eroded 67
JtA—Jimtown loam, 0 to 3 percent slopes 68
KeB—Keene silt loam, 2 to 6 percent slopes 69
KeC2—Keene silt loam, 6 to 15 percent slopes, eroded 70
Km—Killbuck silt loam, occasionally flooded 71
LaC—Lakin loamy fine sand, 8 to 15 percent slopes 72
LcD—Lakin-Alford complex, 15 to 25 percent slopes 73
Lk—Lindside silt loam, occasionally flooded 74
Lm—Lobdell loam, channery substratum, occasionally flooded 75
Lo—Lorain silty clay 76
LpC2—Lowell silt loam, 8 to 15 percent slopes, eroded 77
LpD2—Lowell silt loam, 15 to 25 percent slopes, eroded 78
LrE2—Lowell-Gilpin complex, 25 to 40 percent slopes, eroded 79
LrF—Lowell-Gilpin complex, 40 to 70 percent slopes 80
Lu—Luray silty clay loam 81
MaB—Markland silt loam, 2 to 6 percent slopes 82
MbC2—Markland silty clay loam, 6 to 15 percent slopes, eroded 82
McD2—Markland-Glenford complex, 15 to 35 percent slopes, eroded 83
MdA—McGary silt loam, 0 to 3 percent slopes 85
Me—Melvin silt loam, frequently flooded 86
MkD—Mertz very cherty silt loam, 15 to 35 percent slopes 86
MrB—Morristown shaly silty clay loam, 1 to 15 percent slopes 87
MrD—Morristown shaly silty clay loam, 15 to 25 percent slopes 88
MrF—Morristown shaly silty clay loam, 25 to 70 percent slopes 89
MsB—Morristown silty clay loam, 1 to 8 percent slopes 90
MsC—Morristown silty clay loam, 8 to 15 percent slopes 91
MsD—Morristown silty clay loam, 15 to 25 percent slopes 92
MsE—Morristown silty clay loam, 25 to 50 percent slopes 93
Ne—Newark silt loam, frequently flooded 93
No—Nolin silt loam, occasionally flooded 94
OmB—Omulga silt loam, 2 to 6 percent slopes 95
OmC—Omulga silt loam, 6 to 15 percent slopes 96
RaB—Rawson silt loam, 2 to 6 percent slopes 97
RfC—Rigley loam, 8 to 15 percent slopes 98
RgD—Rigley channery loam, 15 to 25 percent slopes 99
RhE—Rigley-Coshocton complex, 25 to 40 percent slopes 100
RoF—Rodman gravelly sandy loam, 25 to 70 percent slopes 101
Se—Sebring silt loam 102
St—Stonelick loam, occasionally flooded 103
Ta—Tioga fine sandy loam, rarely flooded 103
Tf—Tioga fine sandy loam, occasionally flooded 104
Ud—Udorthents, loamy, hilly 105
Ug—Udorthents, sandy, rolling 106
Uh—Udorthents, sandy-skeletal, steep 106
Uk—Udorthents-Pits complex 106
UsB—Urban land-Glenford complex, 2 to 8 percent slopes 107
UtA—Urban land-Nolin complex, rarely flooded 108
UvB—Urban land-Watertown complex, 1 to 15 percent slopes 109
UwC—Urban land-Wellston complex, 5 to 15 percent slopes 109
WaB—Watertown sandy loam, 1 to 8 percent slopes 110
WaC—Watertown sandy loam, 8 to 15 percent slopes 111
WhB—Wellston silt loam, 2 to 8 percent slopes 111
WhC2—Wellston silt loam, 8 to 15 percent slopes, eroded 112

WmB—Westgate silt loam, 2 to 6 percent slopes 113
WmC2—Westgate silt loam, 6 to 15 percent slopes, eroded 114
WtC2—Westmoreland silt loam, 8 to 15 percent slopes, eroded 115
WtD2—Westmoreland silt loam, 15 to 25 percent slopes, eroded 116
WtE—Westmoreland silt loam, 25 to 40 percent slopes 117
WuC2—Westmoreland-Guernsey silt loams, 8 to 15 percent slopes, eroded 117
WuD2—Westmoreland-Guernsey silt loams, 15 to 25 percent slopes, eroded 119
WuE2—Westmoreland-Guernsey silt loams, 25 to 40 percent slopes, eroded 120
WvD—Westmoreland-Urban land complex, 15 to 35 percent slopes 121
ZnB—Zanesville silt loam, 2 to 6 percent slopes ... 122
ZnC2—Zanesville silt loam, 6 to 15 percent slopes, eroded 124

Summary of Tables

Temperature and precipitation (table 1) 208

Freeze dates in spring and fall (table 2) 209

Growing season (table 3) 209

Acreage and proportionate extent of the soils (table 4) 210

Prime farmland (table 5) 212

Land capability and yields per acre of crops and pasture (table 6) 213

Capability classes and subclasses (table 7) 219

Woodland management and productivity (table 8) 220

Woodland harvesting and regeneration activities (table 9) 237

Christmas tree suitability ratings (table 10) 243

Windbreaks and environmental plantings (table 11) 247

Recreational development (table 12) 257

Wildlife habitat (table 13) 266

Building site development (table 14) 273

Sanitary facilities (table 15) 282

Construction materials (table 16) 291

Water management (table 17) 299

Engineering index properties (table 18) 307

Physical and chemical properties of the soils (table 19) 322

Soil and water features (table 20) 329

Engineering index test data (table 21) 334

Classification of the soils (table 22)...................................... 336

Foreword

This soil survey contains information that can be used in land-planning programs in Muskingum County. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Natural Resources Conservation Service or Ohio State University Extension.

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Soil Survey of
Muskingum County, Ohio

By Joseph R. Steiger, Natural Resources Conservation Service

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United States Department of Agriculture, Natural Resources Conservation Service,
in cooperation with
the Ohio Department of Natural Resources, Division of Soil and Water Conservation;
Ohio Agricultural Research and Development Center; and Ohio State University Extension

Muskingum County is in the east-central part of Ohio (fig. 1). It has a total area of about 416,640 acres, or 651 square miles. In 1980, the population was almost 83,000. Zanesville, which is near the center of the county, is the county seat.

Industry and farming are the major enterprises in Muskingum County, but pasture and woodland are the dominant land uses. Woodland and pastureland make up about 61 percent of the acreage in the county. Other land uses include cropland and residential and recreational development. Industry is highly diversified and includes the manufacturing of electrical components, glassware, concrete products, steel, iron castings, and food products. The production of coal, oil and gas, gravel, and limestone also are important industries in the county. Farm income is predominantly from dairy products, cash grain crops, and the sale of livestock. The major crops include corn, wheat, soybeans, oats, and hay. Specialty crops, such as vegetables, fruits, berries, and Christmas trees, are the most recent source of farm income.

Most of the soils on terraces, ridgetops, and shoulders are well suited to farming and residential development. If well managed, these soils are highly productive. Poor natural drainage is the major limitation affecting farming on the terrace soils that formed in lake sediments. The hazard of erosion, the slope, hillside slippage, a high shrink-swell potential, a moderate depth to bedrock, and slow permeability are the major management concerns on sloping to moderately steep soils. The steep or very steep soils are used mainly as woodland because they have severe limitations that affect other uses.

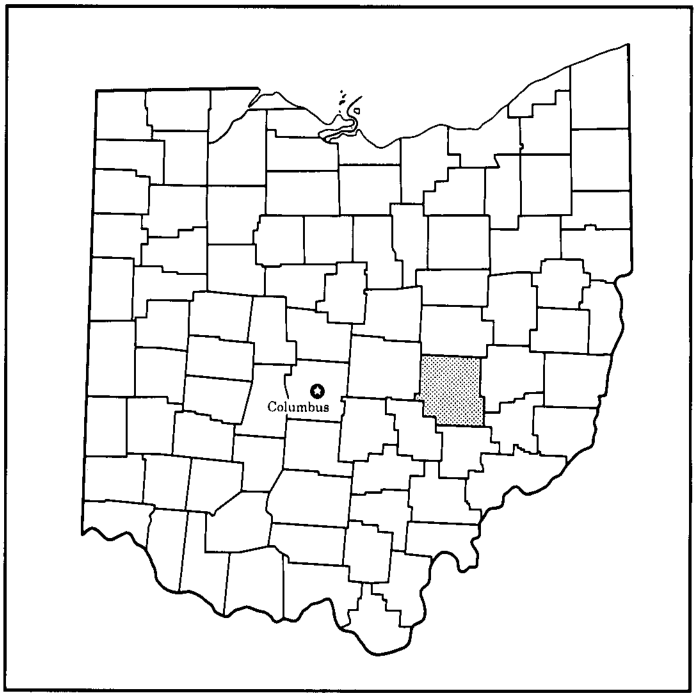

Figure 1.—Location of Muskingum County in Ohio.

This survey updates the soil surveys of Muskingum County published in 1930 *(27)* and in 1944 *(38)*. It provides additional information and has larger maps, which show the soils in greater detail.

General Nature of the County

This section provides some general information about Muskingum County. It describes climate; physiography, relief, geology, and drainage; natural resources; farming; and land ownership patterns.

Climate

Muskingum County is cold in the winter and quite hot in the summer. Winter precipitation, frequently in the form of snow, results in a good accumulation of soil moisture by spring and minimizes drought during summer in most areas. Normal annual precipitation is adequate for all of the crops that are adapted to the temperature and length of the growing season in the area.

Table 1 gives data on the temperature and precipitation in the survey area as recorded at Zanesville, Ohio, in the period 1951 to 1986. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter, the average temperature is 30 degrees F and the average daily minimum temperature is 21 degrees. The lowest temperature on record, which occurred at Zanesville on January 17, 1977, is -19 degrees. In summer, the average temperature is 71 degrees and the average daily maximum temperature is 82 degrees. The highest recorded temperature, which occurred on September 3, 1953, is 102 degrees.

Growing degree days are shown in table 1. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (50 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

Of the total annual precipitation, 22 inches, or 60 percent, usually falls in April through September. The growing season for most crops falls within this period. In 2 years out of 10, the rainfall in April through September is less than 18 inches. The heaviest 1-day rainfall during the period of record was 4.37 inches at Zanesville on March 9, 1964. Thunderstorms occur on about 42 days each year.

The average seasonal snowfall is about 25 inches. The greatest snow depth at any one time during the period of record was 20 inches. On the average, 32 days of the year have at least 1 inch of snow on the ground. The number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 60 percent. Humidity is higher at night, and the average at dawn is about 80 percent. The sun shines about 60 percent of the time possible in summer and 35 percent in winter. The prevailing wind is from the south. Average windspeed is highest, 11 miles per hour, in spring.

Tornadoes and severe thunderstorms occur occasionally. These storms are usually local and of short duration and cause damage in a variable pattern.

Physiography, Relief, Geology, and Drainage

Muskingum County is on the unglaciated, dissected Allegheny Plateau. The underlying bedrock in the county is mainly sandstone, siltstone, clay shale, and limestone, all of which were derived from sediments laid down during the Late Mississippian, the Pennsylvanian, and the Early Permian periods *(32)*.

The oldest rock formations in the survey area formed approximately 330 million years ago during the Late Mississippian period. During that period, stratified layers of sandstone, coal, shale, and limestone developed. In Muskingum County, the Mississippian period is represented by the Logan Formation and the Maxville Limestone Formation. The Logan Formation is exposed primarily in the northwestern part of the county, and the Maxville Limestone Formation crops out in the southwestern part *(7)*.

During the Pennsylvanian period, sedimentary rocks belonging to the Pottsville and Allegheny Systems formed. These systems include deposits of sandstone, shale, clay, limestone, and coal. Outcrops of the Allegheny System are primarily in the central part of the county, but some are on the highest ridges and peaks in the western part. Outcrops of the Pottsville System are mostly in the western half of the county. Rocks of both systems are exposed in the deeper valleys of the east-central part of the county.

Also during the Pennsylvanian period, calcareous clay shales, well developed coals, and marly to well stratified beds of limestone developed from freshwater and marine sediments to form the Conemaugh and Monongahela Systems. Outcrops of the Conemaugh System are throughout the eastern part of the county. The Monongahela System is exposed mainly in the southeastern part of the county.

The final stages of preglacial deposition of freshwater sediments in the survey area occurred 275 million years ago. Remnants of Early Permian limestone, shale, and sandstone are on the highest knobs in Meigs Township. High Hill is the most notable remnant.

During the Pleistocene Epoch, huge continental glaciers formed at various times and moved southward over North America. The only ice sheet known to have entered the survey area was the Illinoian glacier. This glacier wound its way through the western part of the survey area, near the present village of Gratiot *(12)*. The glacier was not powerful enough to level the existing bedrock hills. It flowed around the hills and scoured the areas between the hills and the valleys but left the highest knobs and ridges of Mississippian age untouched. Evidence of the Illinoian glacier is along the western valleys and ravines, where thick deposits of glacial till have accumulated.

The Illinoian ice sheet and the more recent Wisconsinan ice sheets affected the survey area in other ways. Thick blocks of ice and accumulations of debris diverted the preglacial rivers and streams and created glacial lakes, which fingered into the survey area. The best evidence of this influence is found in the northern part of Muskingum County, where the Muskingum River diverts from its western course and flows south. The ancient Newark River once flowed westward through a wide valley in the northern part of the survey area. As the ice sheets advanced and retreated, the river channel became obstructed, which resulted in the formation of a huge lake at an elevation of about 850 feet. As the glacial lake filled with sediment and more water, an outlet formed to accommodate the overflow, thus creating the Muskingum River. The formation of other ancient streams followed a similar pattern.

As the last ice sheets retreated, new drainage systems formed. Meltwater from the glaciers formed meandering streams. These streams carried gravelly and sandy sediments, which were laid down to form glacial outwash terraces and alluvial flood plains. These terraces and flood plains are evident along the Muskingum and Licking River Valleys. Thick deposits of silt, clay, and fine sand remaining from the ancient glacial lakes were subjected to wind erosion, and thick deposits of loess accumulated on the nearby ridges and hills.

Over the course of geologic time, crustal uplifting, erosion, weathering, and deposition formed hills, ridges, and valleys. The eastern, or highest, part of the county is thoroughly and deeply dissected and consists of narrow ridges that spread in a dendritic pattern between the drainageways. The valleys are narrow and V-shaped and have steep slopes. Narrow flood plains are below the valley slopes. In this part of the county, the majority of the ridgetops are at least 1,000 feet above sea level and some reach an elevation of more than 1,100 feet. In the southeastern part of the county, the elevation ranges from 1,280 feet at High Hill, which is the highest point in the county, to 660 feet at the lowest point, which is where the Muskingum River leaves the county.

The central, western, and northern parts of the county are characterized by hilly or rolling relief. Ridges are wide, smooth, and rolling. Slopes are gentle, and valleys are wider than in the eastern part of the county. Ridgetops range from 900 to 1,000 feet in elevation.

The county is drained by the Muskingum River and its main tributaries, the Licking River and Wills, White Eyes, Wakatomika, Moxahala, Jonathan, Symmes, Brush, and Salt Creeks.

Natural Resources

Soil is the most valuable natural resource in Muskingum County. The soils in the county produce the crops that are marketed as grain or are fed to livestock *(9)*.

The supply of ground water is limited in most of the county. The flood plains along the Muskingum River are a source of ground water, and well fields for the city of Zanesville are on the flood plain north of the city. Wells in the fill of valleys generally are adequate for residential use, but in some areas they are unsuitable because of contamination from mine waste. In upland areas the water underlying sandstone layers of Pennsylvanian age is generally adequate for residential use. Most farms have one or more springs that are suitable for watering livestock or for domestic use. Runoff water also can be used if suitable ponds are available. The water quality of rivers and streams in some areas has been degraded by sediment and acid runoff from areas used for mining. Runoff carrying industrial waste, sediment from crop fields, animal waste, or fertilizer has also affected the quality of water in some areas.

Flooding in the Licking and Muskingum River Valleys has been partially controlled by flood-control projects of the U.S. Army Corps of Engineers and the Muskingum Watershed Conservancy District. Dillon Lake and Wills Creek Reservoir are the major flood-control projects in the county.

Bituminous coal is the most important mineral resource in the county and has been mined for many years. Prior to 1940, most of the coal mines in the survey area were deep mines. Since 1940, however, surface mining and strip mining have been used. Coal deposits of the Monongahela Formation are in the southeastern part of the county, which is a major coal-mining region. Coal deposits of the Allegheny Formation are mined throughout the county, but they are mainly west of the Muskingum River in the north-central part of the county, which is another major coal-mining area. Prior to the enactment of mine reclamation laws, mined areas were abandoned and were not reclaimed. Unreclaimed areas are severely eroded, barren, and unproductive, and acid runoff is common. Since the mine reclamation laws were enacted, mined areas have been reclaimed or are in the process of being reclaimed.

The county has a variety of other mineral and energy resources. Oil and natural gas have long been produced from strata of Silurian to Pennsylvanian age. Limestone of the Maxwell Formation is quarried in the county. The limestone has various uses, including crushed stone, concrete aggregate, and agricultural lime. A major limestone quarry that is used for producing cement is near Fultonham in the southwestern part of the county. Clay shale of the Allegheny Formation is mined in the southwest corner of the county near Roseville, which once had an important brick and pottery industry. Sand and gravel pits are scattered along the Muskingum River, in areas of glacial outwash.

Trees are a valuable but underdeveloped resource in the county. Timber is harvested, but most of it is transported outside the county to be processed into pulpwood, pallets, poles, lumber, and veneer products. Only a few sawmills in the county produce lumber products. Most of the harvested timber that remains in the county is used for fence posts or firewood.

Farming

Farming is an important source of income in Muskingum County. Most farms are a combined grain and livestock enterprise (fig. 2). General livestock farms and dairy farms are throughout the county. Intensive cash grain operations are concentrated in the northern part of the county, around Dresden and Frazeysburg.

Most of the farms in the county are owned by individuals or families *(37)*. The majority of the landowners are part-time farmers who receive income from sources other than farming. The average age of the farmers in the county is more than 50 years.

In 1982, there were 1,135 farms in Muskingum County and the average farm size was 185 acres *(10)*. Most of these farms ranged from 50 to 500 acres in size.

In 1982, the income from agricultural production in the county was about $22 million. About two-thirds of the total farm income was from livestock, mainly beef cattle, dairy cattle, and hogs. The remaining one-third of the total income was from cash crop production, mainly corn *(26)*.

Land Ownership Patterns

About 210,000 acres, or roughly half of the land in the county, is owned by farmers *(37)*. About 10,000 acres is owned by the State or is federally owned. About 100,000 acres is owned or leased by private mining companies. About 23,000 acres is urban land *(23)*. Most of the remaining 74,000 acres is idle land that is held by absentee landowners. Most of this idle land is used only for oil production or for hunting. Some of the land is held for investment purposes because of the possible presence of large energy reserves of coal, oil, and gas.

How This Survey Was Made

This survey was made to provide information about the soils in the survey area. The information includes a description of the soils and their location and a discussion of the suitability, limitations, and management of the soils for specified uses. Soil scientists observed the steepness, length, and shape of slopes; the general pattern of drainage; the kinds of crops and native plants growing on the soils; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

The soils in the survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil is associated with a particular kind of landscape or with a segment of the landscape. By observing the soils in the survey area and relating their position to specific segments of the landscape, a soil scientist develops a concept, or model, of how the soils were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations,

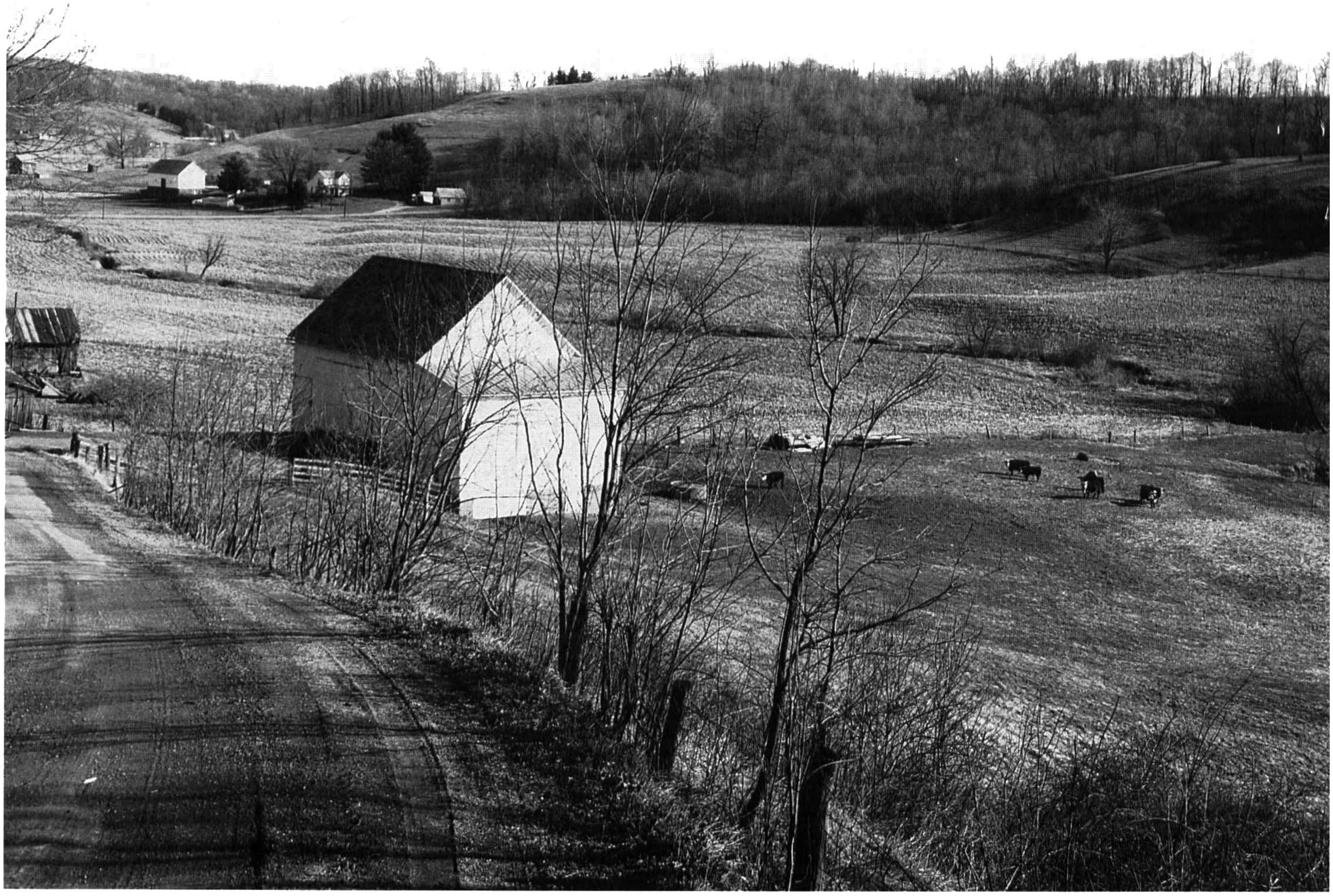

Figure 2.—Crops and pasture in an area of Glenford and Newark soils. The woodlands in the background are in steep areas of Coshocton and Westmoreland soils.

supplemented by an understanding of the soil-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. The system of taxonomic classification used in the United States is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot assure that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Some of the boundaries on the soil maps of Muskingum County do not match those on the soil maps of adjacent counties, and some of the soil names and descriptions do not fully agree. The differences are the result of improvements in the classification of soils, particularly modifications or refinements in soil series concepts. Also, there may be differences in the intensity of mapping or in the extent of the soils within the survey area.

Map Unit Composition

A map unit delineation on a soil map represents an area dominated by one major kind of soil or an area dominated by two or three kinds of soil. A map unit is identified and named according to the taxonomic classification of the dominant soil or soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural objects. In common with other natural objects, they have a characteristic variability in their properties. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of soils of other taxonomic classes. Consequently, every map unit is made up of the soil or soils for which it is named and some soils that belong to other taxonomic classes. These latter soils are called inclusions or included soils.

Most inclusions have properties and behavioral patterns similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting (similar) inclusions. They may or may not be mentioned in the map unit descriptions. Other inclusions, however, have properties and behavior divergent enough to affect use or require different management. These are contrasting (dissimilar) inclusions. They generally occupy small areas and cannot be shown separately on the soil maps because of the scale used in mapping. The inclusions of contrasting soils are mentioned in the map unit descriptions. A few inclusions may not have been observed and consequently are not mentioned in the descriptions, especially where the soil pattern was so complex that it was impractical to make enough observations to identify all of the kinds of soil on the landscape.

The presence of inclusions in a map unit in no way diminishes the usefulness or accuracy of the soil data. The objective of soil mapping is not to delineate pure taxonomic classes of soils but rather to separate the landscape into segments that have similar use and management requirements. The delineation of such landscape segments on the map provides sufficient information for the development of resource plans, but onsite investigation is needed to plan for intensive uses in small areas.

Survey Procedures

The general procedures followed in making this survey are described in the "National Soil Survey Handbook" of the Natural Resources Conservation Service. The soil survey maps made for conservation planning on individual farms prior to the start of the project soil survey were among the references used. Previous soil surveys of the county were also used.

Before the actual fieldwork began, preliminary boundaries of slopes and landforms were plotted stereoscopically on aerial photographs that were taken in 1977 at a scale of 1:15,840. United States Geological Survey topographic maps at a scale of 1:24,000 were studied to relate land and image features.

Soil scientists traversed the landscape on foot to examine the soils. In areas where the land use is intensive, such as areas of the Glenford-Newark-Fitchville association, the intervals of the traverses were as close as 200 yards. In areas where the land use is less intensive, such as areas of the Westmoreland-Coshocton-Rigley association, traverses were about one-quarter mile apart.

As the traverses were made, the soil scientists divided the landscape into segments that reflected differences in the use and management of the soils. For example, a hillside would be separated from a swale and a gently sloping ridgetop would be separated from a very steep hillside. In most areas, soil examinations along the traverses were made at intervals of 100 to 800 yards, depending on the land use and the pattern of the soils. Observations of details, such as landforms, uprooted trees, vegetation, road banks, and animal burrows, were made consistently without regard to spacing. Soil boundaries were determined on the basis of soil examinations, observations, and photo interpretation. The soil material was examined to a depth of about 4 feet with the aid of a hand probe or an auger. The pedons described as typical were observed and studied to a depth of 5 or 6 feet in pits that were dug with shovels, mattocks, and digging bars.

At the beginning of the survey, sample blocks were selected to represent the major landscapes in the county. These areas were mapped at a rate that was roughly half that used in the rest of the county. Extensive notes were taken on the composition of map units in the sample blocks. These preliminary notes were modified as mapping progressed and were used to reach the final assessment of the composition of the individual map units.

Some transects were made to determine the composition of soil complexes, especially the Rigley-Coshocton, Westmoreland-Guernsey, and Lowell-Gilpin complexes.

Samples used for chemical and physical analyses and for analysis of engineering properties were taken from representative sites of several of the soils in the survey area. The chemical and physical analyses were made by the Soil Characterization Laboratory, Department of Agronomy, Ohio State University, Columbus, Ohio. The results of the analyses are stored in a computerized data file at the laboratory. The analysis of engineering properties was made by the Ohio Department of Transportation, Division of Highways, Bureau of Testing, Soil and Foundation Section, Columbus, Ohio. A description of the laboratory procedures can be obtained on request from these laboratories. The results of the laboratory analyses can be obtained from the Department of Agronomy, Ohio State University, Columbus, Ohio; the Ohio Department of Natural Resources, Division of Soil and Water Conservation, Columbus, Ohio; and the Natural Resources Conservation Service, State Office, Columbus, Ohio.

After completion of the soil mapping on aerial photographs, map unit delineations were transferred to the publication atlas sheets, which are a set of aerial photographs taken in November 1981.

General Soil Map Units

The general soil map at the back of this publication shows the soil associations in this survey area. Each association has a distinctive pattern of soils, relief, and drainage. Each is a unique natural landscape. Typically, an association consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one association can occur in another but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one association differ from place to place in slope, depth, drainage, and other characteristics that affect management.

Soil Descriptions

David T. Scott, soil scientist, Natural Resources Conservation Service, helped prepare this section.

1. Wellston-Zanesville-Alford Association

Deep, well drained and moderately well drained, gently sloping and strongly sloping soils that formed in loess and material weathered from sandstone and siltstone; on uplands

These soils are on some of the broader upland ridgetops that are covered by a mantle of loess. The loess varies in thickness, but commonly it is thickest at the center of the ridgetops. In areas where the loess is thick, the soils formed entirely in loess. In areas where the loess is thinner, the soils are underlain by sandstone and siltstone residuum or colluvium. The broad ridgetops consist of knolls and shoulders. Benches and saddles are between the knolls. Some of the ridgetops are slightly dissected by shallow drainage channels. Slopes range from 2 to 15 percent and are generally smooth and convex.

This association makes up about 8 percent of the county. It is about 25 percent Wellston soils, 20 percent Zanesville soils, 15 percent Alford soils, and 40 percent soils of minor extent.

The well drained Wellston soils are on broad ridgetops and shoulder slopes and in saddles between knolls. These soils formed in a mantle of loess and in the underlying sandstone and siltstone residuum. Permeability is moderate. Slopes are smooth and convex. The strongly sloping shoulder slopes are dissected by a few shallow drainageways.

The moderately well drained and well drained Zanesville soils are on benches and shoulders and in saddles on broad ridgetops. These soils formed in a mantle of loess and in the underlying sandstone and siltstone residuum or colluvium. They have a fragipan. A seasonal high water table is perched above the fragipan during extended wet periods. Permeability is moderate above the fragipan and moderately slow or slow in the fragipan.

The well drained Alford soils are on knolls, in saddles, and on shoulder slopes of broad ridgetops and on shoulder slopes of dissected terraces at the margin of broad valleys. These soils formed in a thick mantle of loess. Permeability is moderate.

Of minor extent in this association are Coshocton, Gilpin, Glenford, and Rigley soils. The loamy Coshocton soils are on the concave side slopes of hills. The moderately deep Gilpin soils are on ridgetops and shoulders. Glenford soils are on terraces. They formed in lacustrine deposits. Rigley soils are on ridgetops and shoulders. They have more sand in the subsoil and substratum than the major soils.

Most areas of this association are used as cropland. Some areas near Zanesville are used for residential and commercial development. The Zanesville municipal airport is in an area of this association.

The soils in this association are well suited or moderately suited to crops and pasture. Erosion is the main management concern. About 25 percent of the acreage is prime farmland. Damage caused by surface crusting and frost heave is a management concern in areas used for alfalfa. Areas of this association are not used extensively as woodland, but the major soils are well suited to many upland tree species.

These soils are well suited or moderately well suited to use as sites for buildings and homes. Seasonal wetness is a limitation in areas of Zanesville soils. The slope is a management concern in strongly sloping areas. The Alford and Wellston soils are better suited to use as sites for septic tank absorption fields than the Zanesville soils. Restricted permeability in the lower part of the subsoil and seasonal wetness are limitations in areas of the Zanesville soils. The depth to bedrock is a limitation in areas of the Wellston soils. The slope is a management concern in strongly sloping areas.

2. Mertz-Keene-Frankstown Variant Association

Deep and moderately deep, gently sloping to steep, moderately well drained and well drained soils that formed in loess, colluvium, and material weathered from flint, siltstone, and shale; on uplands

These soils are on broad ridgetops and adjoining hillsides in an area known as Flint Ridge, which was a major prehistoric quarry site. Slopes range from 2 to 35 percent.

This association makes up less than 1 percent of the county. It is about 35 percent Mertz soils, 30 percent Keene and similar soils, 10 percent Frankstown Variant soils, and 25 percent soils of minor extent.

The deep, well drained Mertz soils are on gently sloping ridgetops and moderately steep and steep hillsides. These soils formed in flint and siltstone colluvium. Permeability is moderately slow. Slopes are convex and smooth.

The deep, moderately well drained, gently sloping and strongly sloping Keene soils are on broad ridgetops and shoulder slopes. These soils formed in a mantle of loess and in the underlying clay shale residuum. A seasonal high water table is perched in the lower part of the subsoil during extended wet periods. Permeability is moderately slow in the upper part of the profile and moderately slow or slow in the lower part. Slopes are smooth and convex.

The moderately deep, gently sloping, well drained Frankstown Variant soils are intermingled with Mertz soils on ridgetops. Frankstown Variant soils formed in a thin mantle of loess mixed with fragments of flint. Permeability is moderate.

Of minor extent in this association are the well drained Wellston, Rigley, and Westmoreland soils. Wellston soils are on ridgetops and shoulder slopes. They have more silt and less sand in the subsoil than the Mertz and Frankstown Variant soils. Rigley soils are on ridgetops. Westmoreland soils are on ridgetops and hillsides. Rigley and Westmoreland soils have fewer rock fragments in the subsoil than the Mertz soils, have more sand than the Keene soils, and are deeper over bedrock than the Frankstown Variant soils.

The gently sloping and strongly sloping areas of this association are generally used as farmland or pasture. The steeper areas are generally used as pasture or woodland.

The soils in gently sloping and strongly sloping areas are well suited or moderately suited to crops and pasture. About 20 percent of the acreage in this association is prime farmland. The hazard of erosion is the main management concern in areas used for farming. Hard flint fragments in some of the soils can interfere with cultivation, but the larger fragments have been removed in many of the areas used for crops. Frankstown Variant soils are droughty, and the droughtiness limits productivity. The soils in moderately steep and steep areas are well suited to woodland.

The soils in gently sloping and strongly sloping areas are better suited to use as sites for buildings and construction than soils in the steeper areas. In some gently sloping and sloping areas, however, the soils are only moderately deep over flint bedrock, and thus excavating for basements and utility lines is very difficult. Seasonal wetness is a management concern in areas of the Keene soils. The steeper areas are poorly suited to use as sites for buildings because erosion is a hazard during construction and the use of equipment is restricted.

The functioning of septic tank absorption fields is limited by flint bedrock at a depth of 20 to 40 inches in the Frankstown Variant soils, by seasonal wetness in the Keene soils, and by the restricted permeability in the Mertz and Keene soils. The gently sloping Mertz soils are the best suited of the major soils to use as sites for septic tank absorption fields, but suitability decreases as the slope increases.

3. Cincinnati-Coshocton-Homewood Association

Deep, well drained and moderately well drained, gently sloping to moderately steep soils that formed in loess, glacial till, and colluvium derived from sandstone, siltstone, and shale; on uplands

These soils are on ridgetops and hillsides that have been smoothed by glaciation and partially dissected by erosion. The hillsides tend to be long and convex and are dissected by narrow ravines and concave slopes along drainageways. Slopes range from 2 to 25 percent.

This association makes up about 1 percent of the county. It is about 40 percent Cincinnati soils, 20 percent Coshocton soils, 10 percent Homewood soils, and 30 percent soils of minor extent.

The well drained, gently sloping and strongly sloping Cincinnati soils are on the lower ridgetops and on long, convex hill slopes. These soils formed in a mantle of loess and in the underlying glacial till, which is underlain by shale and siltstone. The soils have a fragipan. A seasonal high water table is perched in the lower part of the subsoil during extended wet periods. Permeability is moderate above the fragipan and moderately slow or slow in and below the fragipan.

The moderately well drained, strongly sloping and moderately steep Coshocton soils are on the higher ridgetops and hillsides. These soils formed in colluvium and residuum derived from sandstone, shale, and siltstone. A seasonal high water table is perched in the lower part of the subsoil during extended wet periods. Permeability is moderately slow or slow.

The moderately well drained, strongly sloping and moderately steep Homewood soils are on the lower concave slopes of hillsides and in narrow ravines. These soils formed in glacial till. They have a fragipan. A seasonal high water table is perched above the fragipan in the lower part of the subsoil during extended wet periods. Permeability is moderate above the fragipan and slow in the fragipan.

Of minor extent in this association are the well drained Alford, Gilpin, and Westmoreland soils on high ridgetops and hillsides. Also included are the somewhat poorly drained Newark and poorly drained Melvin soils on flood plains along small streams.

Most areas of this association are used as cropland or pasture. Areas along the steeper slopes and ravines are used as woodland. About 15 percent of the acreage is prime farmland, and a considerable acreage is recognized as locally important farmland.

Depending on the slope, these soils range from well suited to poorly suited to crops. Soils in gently sloping areas are best suited to cropland, and soils in moderately steep areas are poorly suited. The soils are well suited or moderately suited to hay and pasture. The hazard of erosion is the main management concern. The soils are well suited to woodland.

Cincinnati soils are better suited to building site development than the Coshocton and Homewood soils. The slope and seasonal wetness are the main management concerns. The shrink-swell potential is a limitation in the Coshocton and Homewood soils. The restricted permeability and wetness are limitations on sites for septic tank absorption fields. The slope is a management concern in moderately steep areas.

4. Coshocton-Westmoreland-Keene Association

Deep, moderately well drained and well drained, gently sloping to steep soils that formed in colluvium and residuum derived from sandstone, shale, and siltstone; on uplands

These soils are on narrow to broad, elongated ridgetops and hillsides that commonly have smooth, convex and concave slopes. The hillsides are dissected by steep, narrow, V-shaped ravines with drainageways that carry runoff water to small streams on narrow flood plains at the base of the hills. Slopes range from 2 to 40 percent.

This association makes up about 13 percent of the county. It is about 30 percent Coshocton soils, 30 percent Westmoreland soils, 10 percent Keene soils, and 30 percent soils of minor extent.

The moderately well drained, strongly sloping to steep Coshocton soils are in saddles and on the lower part of hill slopes and are in the coves of dissected hills. Some steeper areas are along narrow ridges and are on the slopes of V-shaped ravines. Coshocton soils formed in colluvium derived from sandstone, siltstone, and shale. A seasonal high water table is perched in the lower part of the subsoil during extended wet periods. Permeability is moderately slow or slow.

The well drained, strongly sloping to steep Westmoreland soils are on ridgetops and dissected hillsides. Some steeper areas are along narrow ridges and V-shaped ravines. Westmoreland soils formed in residuum and colluvium derived from sandstone, siltstone, and shale. Permeability is moderate.

The moderately well drained, gently sloping and strongly sloping Keene soils are on the broader ridgetops and benches. These soils formed in a mantle of loess and in the underlying clay shale residuum. Slopes are smooth and convex and are dissected by shallow drainageways. Keene soils in gently sloping areas are prime farmland. A seasonal high water table is perched in the lower part of the subsoil during extended wet periods. Permeability is moderate or moderately slow in the upper part of the profile and moderately slow or slow in the lower part.

Of minor extent in this association are Aaron, Berks, Newark, and Wellston soils. The moderately well drained Aaron soils are on ridgetops. They have more clay in the subsoil than the major soils. The moderately deep, well drained Berks soils are on steep hillsides and in ravines. The somewhat poorly drained Newark soils are on narrow flood plains. The well drained Wellston soils are on ridgetops. They have more silt and less sand than the Coshocton and Westmoreland soils and have fewer rock fragments in the solum.

Areas of this association are used as pasture, cropland, or woodland. About 10 percent of the acreage in this association is prime farmland.

Most of the cropland is on the gently sloping and strongly sloping ridgetops and benches. These areas are well suited or moderately suited to cultivated crops. Erosion is the main management concern. Areas on flood plains also are suitable for cropland if they are wide enough.

The steep hillsides are better suited to woodland than to crops or pasture. Productivity is generally higher in areas on north-facing slopes, which are cooler and wetter than south-facing slopes because of less exposure to the sun and wind. The steep slopes can restrict the use of logging equipment.

The gently sloping and strongly sloping ridgetops and benches are the best suited areas for building sites. Seasonal wetness and the hazard of erosion during construction are the main management concerns in these areas. The steeper slopes are poorly suited to use as sites for buildings because of the hazards of erosion and slippage.

The ridgetops also are the best suited areas for septic tank absorption fields, but seasonal wetness and the restricted permeability are limitations. Excessive downslope seepage of effluent is likely if septic tank absorption fields are installed on the steeper hillsides.

5. Westmoreland-Berks-Guernsey Association

Deep and moderately deep, well drained and moderately well drained, strongly sloping to very steep soils that formed in colluvium and residuum derived from siltstone and clay shale; on uplands

These soils are on dissected hillsides and narrow ridgetops. The hillsides commonly have a stairstep pattern, and narrow benches are between the slopes. Channels carrying surface runoff descend from the hillsides and carve out narrow ridges and V-shaped ravines. Bedrock is exposed along these ridges and ravines, creating bluffs on the ridges and waterfalls along the streams. Narrow flood plains and small streams are at the base of the hillsides. Relief along the valley slopes, from the ridgetops to the flood plain, is as much as 300 feet. Unstable soils are common along these slopes. Throughout the hills are old underground coal mines. Mine entrances, coal tailings, and acid drainage water are in some areas. Slopes range from 6 to 70 percent.

This association makes up about 25 percent of the county. It is about 30 percent Westmoreland soils, 10 percent Berks soils, 10 percent Guernsey soils, and 50 percent soils of minor extent.

The deep, well drained, strongly sloping to very steep Westmoreland soils are on the convex parts of benches and foot slopes and the less sloping parts of hillsides. They formed in residuum or colluvium derived from sandstone, siltstone, and shale. Permeability is moderate.

The moderately deep, well drained, moderately steep to very steep Berks soils are on steep and very steep hillsides. These soils formed in material weathered from shale, siltstone, and sandstone. Rock outcrops of sandstone and siltstone are common. Permeability is moderate or moderately rapid.

The deep, moderately well drained, strongly sloping to steep Guernsey soils are on shoulder slopes, benches, and foot slopes. These soils formed in clay shale residuum and colluvium. A seasonal high water table is perched in the lower part of the subsoil during extended wet periods. Permeability is moderately slow or slow.

Of minor extent in this association are the silt-mantled Alford, Keene, Wellston, and Zanesville soils on narrow ridgetops and the moderately well drained Lindside and Lobdell soils on narrow flood plains.

Most areas of this association are used as woodland or pasture. About 10 percent of the acreage in this association is prime farmland. Earlier in this century, much of the land in this association was used as pasture or cropland, which resulted in extensive erosion, the formation of gullies, and the loss of productivity. Most of the steeper areas are now used as woodland. Areas of this association are some of the most scenic areas in the county. Rugged terrain, small waterfalls, rock outcrops, and bluffs make these areas attractive and challenging sites for hikers and hunters.

Most of the cropland and pasture is on the narrow ridges, benches, and flood plains, which are the least sloping parts of the landscape. Controlling erosion is the main management concern in areas on the ridgetops and benches that are used for crops or pasture.

Most of the soils in this association are well suited to woodland. The steeper hillsides are better suited to woodland than to most other uses. Erosion is the main management concern. Productivity is higher on north- and east-facing slopes, which are cooler and wetter than south- and west-facing slopes because of less exposure to the sun and wind. Steep slopes restrict the use of logging equipment.

The best sites for buildings and septic tank absorption fields are on the ridgetops. Seasonal wetness is a problem in some ridgetop areas. Some areas on benches are subject to slippage.

6. Westmoreland-Coshocton-Rigley Association

Deep, well drained and moderately well drained, strongly sloping to very steep soils that formed in colluvium and residuum derived from siltstone, shale, and sandstone; on uplands

These steep and very steep soils are on highly dissected hillsides and ridgetops, on the upper part of convex hillsides, and in ravines. The hillsides have many intermittent drainage channels, which form dendritic drainage patterns. Siltstone and sandstone rock outcrops are common along streams. Most of the ravines descend into narrow flood plains, which have small streams. Terraces are on foot slopes along the margin of the flood plains. Slopes range from 8 to 70 percent.

This association makes up about 12 percent of the county. It is about 25 percent Westmoreland soils, 20 percent Coshocton soils, 15 percent Rigley soils, and 40 percent soils of minor extent.

The well drained, moderately steep to very steep Westmoreland soils are on ridgetops and dissected hillsides. These soils formed in colluvium and residuum derived from sandstone, siltstone, and shale. Permeability is moderate.

The moderately well drained, strongly sloping and moderately steep Coshocton soils are in saddles on ridgetops and in coves at the head of minor waterways on dissected hills. These soils formed in colluvium derived from sandstone, siltstone, and shale. Slopes are mostly concave. Seeps or springs are common. The seasonal high water table is in the lower part of the subsoil during extended wet periods. Permeability is moderately slow or slow.

The well drained, strongly sloping and moderately steep Rigley soils are on upland ridgetops, on shoulders of the broader ridgetops, and on the upper part of hillsides. These soils formed in loamy colluvium derived from sandstone. Ridgetop areas are generally long and narrow. Slopes are mainly convex. Bedrock outcrops are in some areas. Permeability is moderately rapid.

Of minor extent in this association are Aaron soils on shoulder slopes, benches, and ridgetops. Aaron soils are more clayey than the major soils. Also included are the somewhat poorly drained Newark and poorly drained Melvin soils on narrow flood plains.

Most areas are used as woodland or pasture. Earlier in this century, much of the land in this association was used as pasture or cropland, which resulted in extensive erosion, the formation of gullies, and the loss of productivity. Most of the steeper areas are now used as woodland. About 5 percent of the acreage in this association is prime farmland.

Most of the cropland is on the less sloping ridgetops or shoulder slopes. The hazard of erosion can be very severe in these areas if they are cultivated or plowed. Some narrow flood plains are well suited to cropland.

This association includes some of the most scenic areas in the county. These areas provide excellent habitat for wildlife, such as beaver, deer, fox, squirrel, turkey, grouse, and numerous species of song birds. Rugged terrain, small waterfalls, rock outcrops, and bluffs make these areas attractive and challenging sites for hikers and hunters.

Most areas of this association are moderately suited or poorly suited to pasture and moderately suited or well suited to woodland. The steeper hillsides are better suited to woodland than to pasture. Erosion is the main management concern. Productivity is higher on north-facing slopes, which are cooler and wetter than south-facing slopes because of less exposure to the sun and wind. Steep slopes restrict the use of logging equipment.

Areas on ridgetops are the best suited to use as building sites. Seasonal wetness is a limitation in areas of the Coshocton soils. The steeper hillsides are poorly suited or unsuited to building site development.

The best sites for septic tank absorption fields also are on the ridgetops. The steeper slopes are unsuited to use as sites for septic tank absorption fields because of excessive downslope seepage of effluent.

7. Lowell-Guernsey-Gilpin Association

Deep and moderately deep, gently sloping to very steep, well drained and moderately well drained soils that formed in colluvium and residuum derived from clay shale, limestone, and siltstone; on uplands

These soils are on smooth ridgetops, hillsides, and benches at the higher elevations in the county. Distinct benches on foot slopes are below the steeper hillsides and ridgetops. Limestone beds are present where the benches meet the hillsides. Seeps and springs are common on the benches. Narrow valleys of tributary streams are at the lower elevations. Slopes range from 2 to 70 percent.

This association makes up about 12 percent of the county. It is about 25 percent Lowell soils, 20 percent Guernsey and similar soils, 10 percent Gilpin soils, and 45 percent soils of minor extent.

The deep, well drained, strongly sloping to very steep Lowell soils are on ridgetops and hillsides. Some areas are on benches or foot slopes. Lowell soils formed in residuum derived from clay shale, limestone, and sandstone. Slopes are long and smooth and are commonly convex. A seasonal high water table is perched in the lower part of the subsoil during extended wet periods. Permeability is moderately slow.

The deep, moderately well drained, strongly sloping to steep Guernsey soils are on foot slopes, benches, and dissected hillsides. These soils formed in colluvium derived from clay shale. The surface is hummocky in many areas because of gullies and scars from landslides. A seasonal high water table is perched in the lower part of the subsoil during extended wet periods. Permeability is moderately slow or slow.

The moderately deep, well drained, gently sloping to very steep Gilpin soils are on ridgetops and hillsides in dissected uplands. These soils formed in residuum derived from sandstone and siltstone. Slopes are smooth and slightly convex. Permeability is moderate.

Of minor extent in this association are the reddish Upshur soils. These soils are in landscape positions similar to those of the Guernsey and Lowell soils. Also included are Berks, Westgate, Zanesville, and Lobdell soils. The stony Berks soils are in landscape positions similar to those of the Gilpin soils. Westgate and Zanesville soils are on the wider benches. They have a subsoil that is silty in the upper part. The moderately well drained Lobdell soils are on narrow flood plains.

Most areas of this association are used as pasture or woodland. About 5 percent of the acreage in this association is prime farmland. Gently sloping benches and some of the wider areas on flood plains are used as cropland. Erosion is the main management concern in areas on benches. The strongly sloping ridgetops and benches are suited to pasture.

The steeper hillsides are better suited to woodland than to cropland or pasture. Woodland productivity is usually higher on north- and east-facing slopes, which are cooler and wetter than south- and west-facing slopes because of less exposure to the sun and wind. Steep slopes can restrict the use of logging equipment.

The best building sites are on the strongly sloping ridgetops. Wetness is a problem in some ridgetop areas. The steeper hillsides are generally unsuited to building site development because of slippage and landslides in areas of the Lowell and Guernsey soils.

Most areas of this association are poorly suited to septic tank absorption fields. The depth to bedrock is a limitation in areas of the Gilpin soils, and restricted permeability and seasonal wetness are limitations in areas of the Guernsey and Lowell soils. The steeper hillsides are unsuited to use as sites for septic tank absorption fields because of excessive downslope seepage of effluent.

8. Morristown-Fairpoint-Bethesda Association

Deep, well drained, gently sloping to very steep soils that formed in reclaimed and unreclaimed coal mine spoil; on uplands

These soils are in areas that have been excavated for surface coal mining over the past 50 years and are on undisturbed hillsides and ridgetops in surrounding areas. Some of the mined areas have been reclaimed (fig. 3). Reclaimed areas have been graded to approximately the original contour. Unreclaimed areas consist of long, sinuous, irregular, steep and very steep ridges and trenches and the high vertical walls of abandoned mines. In the surface-mined areas, the original drainage patterns have been altered and ponds or lakes have been created. Slopes range from 1 to 70 percent.

This association makes up about 10 percent of the county. It is about 30 percent Morristown soils, 30 percent Fairpoint soils, 10 percent Bethesda soils, and 30 percent soils of minor extent.

Morristown, Fairpoint, and Bethesda soils are in areas that have been surface-mined for coal. They have moderately slow permeability. These soils differ mainly in acidity. Morristown soils are the least acid, and Bethesda soils are the most acid. Acidity is affected by the relative amounts of limestone, siltstone, sandstone, and shale in the spoil.

Of minor extent in this association are Westmoreland, Lowell, Berks, Rigley, Aaron, Guernsey, Coshocton, Keene, Newark, and Lobdell soils. The well drained Westmoreland, Lowell, Berks, and Rigley soils are in isolated unmined areas on ridges. The moderately well drained Aaron, Guernsey, Coshocton, and Keene soils are in unmined areas on ridgetops, in coves, and on benches. The somewhat poorly drained Newark and moderately well drained Lobdell soils are on flood plains. Also included are areas of mine dumps and pits, which contain very toxic materials, and areas of Udorthents in active mining areas.

Most of the areas of reclaimed mine spoil have been revegetated with grasses and legumes. Because the surface layer has been mixed with subsoil material, the content of organic matter is very low. Most of the soils have a low available water capacity because of the high content of rock fragments and the high density of the underlying material. Less than 2 percent of the acreage in this association is prime farmland.

Most areas of this association are poorly suited to crops, pasture, and woodland because of the limited available water capacity and the poor conditions for root development.

Most areas are poorly suited or unsuited to use as

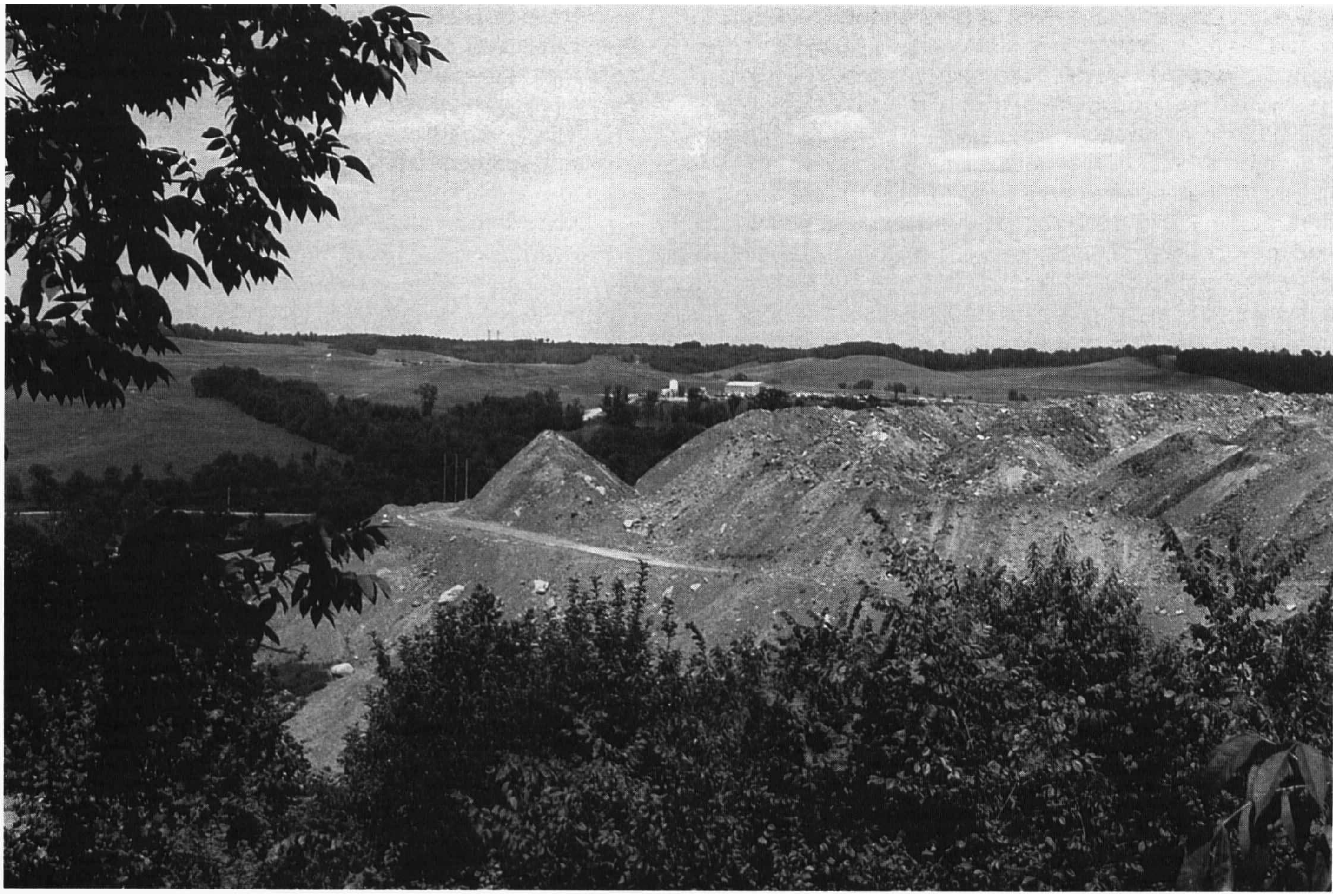

Figure 3.—Surface mining for coal produces massive piles of spoil, which are later graded and reclaimed. Active mine spoil is in the foreground, and a reclaimed area of Fairpoint soils is in the background.

sites for buildings or septic tank absorption fields. Uneven settlement and occasional landslides are hazards on sites for buildings. The suitability of some areas can be improved by reclamation after settling has occurred. The less sloping areas have the most potential as sites for buildings.

9. Glenford-Newark-Fitchville Association

Deep, moderately well drained and somewhat poorly drained, nearly level to strongly sloping soils that formed in lacustrine deposits and alluvium; on terraces and flood plains along minor streams

These soils are on flood plains and terraces in valleys that once held glacial lakes. The valleys range from ¼ mile to 1½ miles in width. The broader valleys are basinlike and are surrounded by uplands. Sloping, dissected terraces and flood plains are along the tributary streams in the narrower glacial lake valleys. Slopes range from 0 to 15 percent.

This association makes up about 11 percent of the county. It is about 25 percent Glenford soils, 15 percent Newark soils, 10 percent Fitchville soils, and 50 percent soils of minor extent.

The moderately well drained, nearly level to strongly sloping Glenford soils are on terraces in valleys. A seasonal high water table is perched in the lower part of the subsoil during extended wet periods. Permeability is moderately slow.

The somewhat poorly drained, nearly level Newark soils are on flood plains along the smaller streams that drain the former lake beds. These soils are occasionally flooded. A seasonal high water table is perched in the upper part of the subsoil during wet periods. Permeability is moderate.

The somewhat poorly drained, nearly level and gently sloping Fitchville soils are on slightly dissected terraces in valleys. A seasonal high water table is perched in the upper part of the subsoil during wet periods. Permeability is moderately slow.

Of minor extent in this association are Lorain, Luray, Sebring, Nolin, Markland, and Alford soils. The very poorly drained Lorain and Luray soils and the poorly drained Sebring soils are in depressions and are on flats in lake beds. The well drained Nolin soils are on the higher parts of flood plains. Markland soils are on gently sloping to strongly sloping terraces. They are more clayey than the major soils. The well drained Alford soils are at the margin of lake plains.

The soils in this association are well suited or moderately suited to cropland. Most areas are used for farming. About 60 percent of the acreage in this association is prime farmland if the soils are drained. In the broader valleys, areas on terraces and flood plains are used as farmland. In the narrower valleys, the flood plains are used as pasture and the terraces are used for crop production. Undrained areas of Newark and Fitchville soils also are used as pasture. Erosion is a hazard in sloping areas used for crops. Wetness is a problem in areas of the Newark and Fitchville soils. Flooding delays planting in areas of the Newark soils.

These soils are well suited to woodland. In areas of the Newark and Fitchville soils, tree species that can tolerate wetness are the best suited.

The seasonal high water table, the shrink-swell potential, and low strength are limitations on sites for buildings in areas of the Glenford and Fitchville soils. Seasonal wetness and restricted permeability are limitations on sites for septic tank absorption fields. Newark soils are generally unsuited to use as sites for buildings or septic tank absorption fields because of the flooding.

10. Watertown-Chili-Glenford Association

Deep, well drained and moderately well drained, nearly level to strongly sloping soils that formed in glacial outwash and lacustrine sediments; on terraces along major river valleys

These soils are on a series of glacial outwash terraces in the major stream valleys. The terrace surfaces are separated from each other and from the flood plain by short, steep slopes. Alluvial fans have formed where intermittent streams from the uplands drain onto the terraces. Slopes range from 0 to 35 percent.

This association makes up about 3 percent of the county. It is about 20 percent Watertown soils, 15 percent Chili soils, 15 percent Glenford soils, and 50 percent soils of minor extent.

The well drained, nearly level to strongly sloping Watertown soils are on glacial outwash terraces. These soils formed in sandy and gravelly outwash material. The steeper areas are on short slopes between benches. Permeability is moderately rapid.

The well drained, nearly level to strongly sloping Chili soils are on glacial outwash terraces. These soils formed in loamy and gravelly outwash material. The steeper areas are on knolls and dissected margins of the outwash terraces. Permeability is moderately rapid.

The moderately well drained, nearly level to strongly sloping Glenford soils are on lacustrine terraces. These soils are along the margins of outwash terraces. A seasonal high water table is perched in the lower part of the subsoil during extended wet periods. Permeability is moderately slow.

Of minor extent in this association are Rodman, Markland, Nolin, and Tioga soils. The excessively drained Rodman soils are on steep dissected hillsides and very steep escarpments on glacial outwash terraces. Markland soils are mapped as a complex with Glenford soils on moderately steep and steep dissected terraces. They are more clayey than the major soils. Nolin and Tioga soils are on flood plains and are subject to flooding.

Areas of this association are used for a variety of purposes. Most areas are used as cropland. Specialty crops, truck crops, and nursery crops are grown in some areas. Many areas have been developed for residential housing and other urban uses, especially near Zanesville. Some areas are used for surface mining of sand and gravel. Very few areas are wooded.

About 40 percent of the acreage in this association is prime farmland. Nearly level and gently sloping soils are well suited to crops and pasture. Controlling erosion and conserving moisture are the main management concerns. Soils in the more strongly sloping areas are better suited to pasture than to cropland because of the hazard of erosion.

The soils in this association are well suited to use as sites for buildings, but seasonal wetness is a limitation in areas of the Glenford soils.

The nearly level and gently sloping areas of Watertown and Chili soils are well suited to septic tank absorption fields. Glenford soils are only moderately suited because of the restricted permeability.

11. Tioga-Nolin-Newark Association

Deep, well drained and somewhat poorly drained, nearly level soils that formed in alluvium; on flood plains along the major streams and river valleys

These soils are on the wider parts of flood plains along the major rivers and their tributaries. The flood plains consist of a series of levels that vary in elevation by only a few feet. The higher levels are subject to rare flooding, and the lower levels are subject to occasional flooding. Flooding is partially controlled by upstream dams of the Muskingum Watershed Conservancy District and by the Dillon Lake dam. Slopes range from 0 to 3 percent.

This association makes up about 5 percent of the county. It is about 30 percent Tioga and similar soils, 20 percent Nolin soils, 10 percent Newark soils, and 30 percent soils of minor extent. The remaining 10 percent consists of areas of water, mainly the Muskingum River.

Tioga soils are well drained. The seasonal high water table is affected by the level of the stream flow, but it is usually at a depth of more than 4 feet. Permeability is moderate or moderately rapid.

Nolin soils are well drained. They are occasionally flooded. The seasonal high water table is controlled by the level of the stream flow. Permeability is moderate.

Newark soils are on the lower parts of the flood plains and are somewhat poorly drained. Flooding is frequent, usually occurring during the growing season in the form of flash floods after intense local thunderstorms. A seasonal high water table is in the upper part of the subsoil during wet periods. Permeability is moderate.

Of minor extent in this association are Glenford, Fitchville, Cidermill, Chavies, Chili, and Watertown soils. The moderately well drained Glenford and somewhat poorly drained Fitchville soils are on lacustrine terraces. The well drained Cidermill soils are on broad glacial outwash terraces and deltas. They have a mantle of windblown silt. The well drained Chavies, Chili, and Watertown soils are on glacial outwash terraces.

About 60 percent of the acreage in this association is prime farmland. Most areas are used as cropland. Very few areas are wooded.

The soils in this association are well suited to intensive production of row crops, forage plants, or specialty crops. Flooding is the major management concern. The seasonal high water table in the Newark soils also is a limitation. Tioga and Nolin soils can be irrigated. Flooding may limit or delay crop production.

Most areas of this association are unsuited to building site development because of the hazard of flooding. Only well drained areas that are rarely flooded are suited to use as sites for septic tank absorption fields. The contamination of ground water is possible, however, in areas that have sandy or gravelly underlying material because this material does not adequately filter the effluent.

Detailed Soil Map Units

The map units on the detailed soil maps at the back of this survey represent the soils in the survey area. The map unit descriptions in this section, along with the soil maps, can be used to determine the suitability and potential of a soil for specific uses. They also can be used to plan the management needed for those uses. More information on each map unit, or soil, is given under the heading "Use and Management of the Soils."

Each map unit on the detailed soil maps represents an area on the landscape and consists of one or more soils for which the unit is named.

A symbol identifying the soil precedes the map unit name in the soil descriptions. Each description includes general facts about the soil and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer or of the underlying material, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the underlying material. They also can differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Chili gravelly loam, 0 to 3 percent slopes, is a phase of the Chili series.

Some map units are made up of two or more major soils. These map units are called soil complexes. A *soil complex* consists of two or more soils, or one or more soils and a miscellaneous area, in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. Berks-Westmoreland complex, 40 to 70 percent slopes, is an example.

Most map units include small scattered areas of soils other than those for which the map unit is named. Some of these included soils have properties that differ substantially from those of the major soil or soils. Such differences could significantly affect use and management of the soils in the map unit. The included soils are identified in each map unit description. Some small areas of strongly contrasting soils are identified by a special symbol on the soil maps.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Dumps and Pits, mine, is an example. Miscellaneous areas are shown on the soil maps. Some that are too small to be shown are identified by a special symbol on the soil maps.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of Tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils.

Soil Descriptions

AaB—Aaron silt loam, 2 to 8 percent slopes. This deep, gently sloping, moderately well drained soil is on knolls or is in saddles on upland ridgetops. Most areas are oval and range from 3 to 20 acres in size.

Typically, the surface layer is dark grayish brown, friable silt loam about 9 inches thick. The upper part of the subsoil is yellowish brown, firm silty clay loam about 12 inches thick. The lower part of the subsoil is yellowish brown, firm silty clay and light olive brown, firm clay and silty clay loam about 29 inches thick. Grayish brown, soft clay shale bedrock is at a depth of about 50 inches. A few areas are eroded. Some areas on the crests of small knolls are well drained. In some areas the subsoil is more acid. Some areas are on foot slopes.

Included with this soil in mapping are small areas of Westgate, Westmoreland, and Claysville soils. Westgate soils are in saddles and are near the center of the wider ridgetops. Westmoreland soils are in the more sloping areas. They have less clay and more channers in the subsoil than the Aaron soil. The somewhat poorly drained Claysville soils are near seep zones and springs. Also included are areas of soils that have slightly less clay in the subsoil than the Aaron soil. Included soils make up about 20 percent of most delineations.

Permeability is slow in the Aaron soil. Runoff is medium. Available water capacity is moderate. The content of organic matter in the surface layer also is moderate. The root zone is deep. A seasonal high water table is perched in the lower part of the subsoil during extended wet periods. The potential for frost action is high. The shrink-swell potential is high in the subsoil.

Most areas are used as cropland or pasture. Some areas are used as woodland.

This soil is well suited to cultivated crops. Erosion is the main management concern. The hazard of erosion is moderate in cultivated areas. If the soil is cultivated, surface crusting after rains reduces the rate of water infiltration and retards the emergence of seedlings. Using a system of conservation tillage, such as no-till farming, that leaves crop residue on the surface, including grasses and legumes in the cropping system, planting cover crops, tilling on the contour, and establishing grassed waterways can reduce the hazard of erosion. The clayey subsoil dries slowly and warms up slowly in the spring. Subsurface drains reduce wetness in scattered low-lying areas, but they must be closely spaced because of the slow permeability in the subsoil. Limiting fieldwork when the surface layer and subsoil are too wet helps to minimize compaction.

This soil is well suited to pasture. Wetness and the clayey subsoil restrict the root development of some legumes. Frost heave can damage deep-rooted legumes, especially in pure stands. Leaving a protective cover on the surface in the fall or seeding a grass-legume mixture can minimize the damage caused by frost heave. If the soil is plowed, the hazard of erosion is moderate. Seeding companion crops, adding mulch, or using no-till seeding methods can reduce the hazard of erosion.

This soil is well suited to timber production. No major limitations affect the planting or growth of most species, but the clayey subsoil restricts the root development of some species. Because of low strength, the soil cannot support heavy equipment during wet periods. Spreading aggregate on haul roads or log landings helps to stabilize the surface. Plant competition can be controlled by removing vines and the less desirable trees and shrubs.

This soil is only moderately suited to use as a site for buildings. The seasonal wetness and the high shrink-swell potential are limitations on sites for dwellings, especially dwellings with basements. Waterproofing basement walls and installing drains at the base of footings help to keep basements dry. Reinforcing walls with concrete, supporting the walls with a large spread footing, and backfilling around foundations with material that has a low shrink-swell potential help to minimize the damage caused by shrinking and swelling.

This soil is poorly suited to use as a site for septic tank absorption fields. Specially designed absorption fields are needed because of the seasonal wetness and the slow permeability. Perimeter drains are only moderately effective in lowering the water table because of the slow permeability. Elevating the field with more permeable fill material helps to overcome the restricted permeability. An aerator or an alternative system should be considered.

Because of the ridgetop landscape position of the soil, the watershed area for ponds is limited. Ponds excavated into the clayey subsoil are likely to hold water, but layers of porous or shattered rock below the clay beds can permit excessive seepage if they are exposed.

The land capability classification is IIe. The pasture and hayland suitability group is A-6. The woodland ordination symbol is 4C.

AaC2—Aaron silt loam, 8 to 15 percent slopes, eroded. This deep, strongly sloping, moderately well drained soil is on the shoulder slopes of dissected ridgetops and on benches. A few areas are on knolls. Sheet and rill erosion has removed part of the original surface layer. Most areas are irregular in shape and range from 3 to 100 acres in size.

Typically, the surface layer is dark grayish brown, friable silt loam about 7 inches thick. The upper part of the subsoil is yellowish brown, firm silty clay loam about 9 inches thick. The lower part of the subsoil is yellowish brown, firm silty clay and light olive brown, firm clay and silty clay loam about 30 inches thick. It is mottled. Grayish brown, soft clay shale bedrock is at a depth of about 46 inches. Some areas are more acid. Small areas on ridgetops are gently sloping. Some small areas on the crest of knolls are well drained. In some areas the subsoil has yellowish red colors. In a few severely eroded areas, the surface layer is silty clay loam.

Included with this soil in mapping are areas of Keene and Westmoreland soils. Keene soils are in saddles and are near the center of ridgetops. The upper part of the subsoil in the Keene soils is thicker than that of the Aaron soil. It is silt loam or silty clay loam. In some areas the Keene soils have a subsoil of channery clay loam. Westmoreland soils have more sand and channers and less clay in the subsoil than the Aaron soil. Also included are a few areas of somewhat poorly drained soils near seep zones and springs. Included soils make up about 20 percent of most delineations.

Permeability is slow in the Aaron soil. Runoff is rapid. Available water capacity is moderate. The content of organic matter in the surface layer is moderately low. The root zone is deep. A seasonal high water table is perched in the lower part of the subsoil during extended wet periods. The potential for frost action is high. The shrink-swell potential is high in the subsoil.

Many areas of this soil are used as pasture or cropland. Some areas are used as woodland.

This soil is only moderately suited to cultivated crops. Many areas are significantly eroded, and controlling further erosion is the main management concern. The hazard of erosion is severe in cultivated areas. If the soil is cultivated, surface crusting after rains reduces the rate of water infiltration and retards the emergence of seedlings. Using a system of conservation tillage, such as no-till farming, that leaves crop residue on the surface, including grasses and legumes in the cropping system, planting cover crops, tilling on the contour, stripcropping, and establishing grassed waterways can reduce the hazard of erosion. Limiting fieldwork when the surface layer and subsoil are too wet helps to minimize compaction. Subsurface drains reduce wetness in scattered seepy areas, but they should be closely spaced because of the slow permeability.

This soil is well suited to hay and pasture. The clayey subsoil restricts the root development of some forage plants. Frost heave can damage deep-rooted legumes, especially in pure stands. Leaving a protective cover on the surface in the fall or seeding a grass-legume mixture can minimize the damage caused by frost heave. If the soil is plowed, the hazard of erosion is moderate. Seeding companion crops, adding mulch, or using no-till seeding methods can reduce the hazard of erosion.

This soil is well suited to timber production. No major limitations affect the planting or growth of most tree species, but the clayey subsoil restricts the root development of some species. Because of low strength, the soil cannot support heavy equipment during wet periods. Spreading aggregate on haul roads or log landings helps to stabilize the surface. Plant competition can be controlled by removing vines and the less desirable trees and shrubs.

This soil is only moderately suited to use as a site for buildings. Seasonal wetness and the high shrink-swell potential are limitations, especially on sites for buildings with basements. Designing buildings so that they conform to the natural slope of the land reduces the need for grading. Waterproofing basement walls and installing drains at the base of footings help to keep basements dry. Reinforcing walls with concrete, supporting the walls with a large spread footing, and backfilling around foundations with material that has a low shrink-swell potential minimize the damage caused by shrinking and swelling. The hazard of hillside slippage is increased by cutting and filling, but installing artificial drains in seepy areas reduces this hazard. Removing as little vegetation as possible, mulching, establishing a temporary plant cover, building local roads and streets on the contour, and seeding road cuts can minimize erosion during construction.

This soil is poorly suited to use as a site for septic tank absorption fields because of the slow permeability and seasonal wetness. Installing leach lines on the contour helps to prevent the surfacing of effluent. Perimeter drains can be used to lower the water table. Elevating the field with more permeable fill material helps to overcome the slow permeability. An aerator or an alternative system should be considered.

Some areas of this soil in shallow drainageways have potential as sites for ponds. Ponds excavated into the clayey material are likely to hold water, but layers of more porous rock are below the clay in some areas. Onsite investigation is needed.

This soil is recognized as farmland of local importance. The land capability classification is IIIe. The pasture and hayland suitability group is A-6. The woodland ordination symbol is 4C.

AaD2—Aaron silt loam, 15 to 25 percent slopes, eroded. This deep, moderately steep, moderately well drained soil is on dissected hillsides and benches. Sheet and rill erosion has removed part of the original surface layer. Gullies and soil-creep scars are common. Most areas are long and narrow and range from 10 to 100 acres in size.

Typically, the surface layer is dark grayish brown, friable silt loam about 5 inches thick. The upper part of the subsoil is yellowish brown, firm silty clay loam about 10 inches thick. The lower part is yellowish brown, mottled, firm silty clay and light olive brown, firm clay and silty clay loam about 29 inches thick. Grayish brown, soft clay shale bedrock is at a depth of about 44 inches. In some areas the subsoil is silty clay. Small areas on the crests of knolls are well drained. In places the subsoil has reddish brown colors. In some severely eroded areas, the surface layer is silty clay loam.

Included with this soil in mapping are small areas of the well drained Westmoreland soils. These soils contain more sand and channers and less clay in the subsoil than the Aaron soil. Also included are soils near seep zones and along drainageways that are wetter than the Aaron soil. Included soils make up about 20 percent of most delineations.

Permeability is slow in the Aaron soil. Runoff is very rapid. Available water capacity is moderate. The content of organic matter in the surface layer is moderately low.

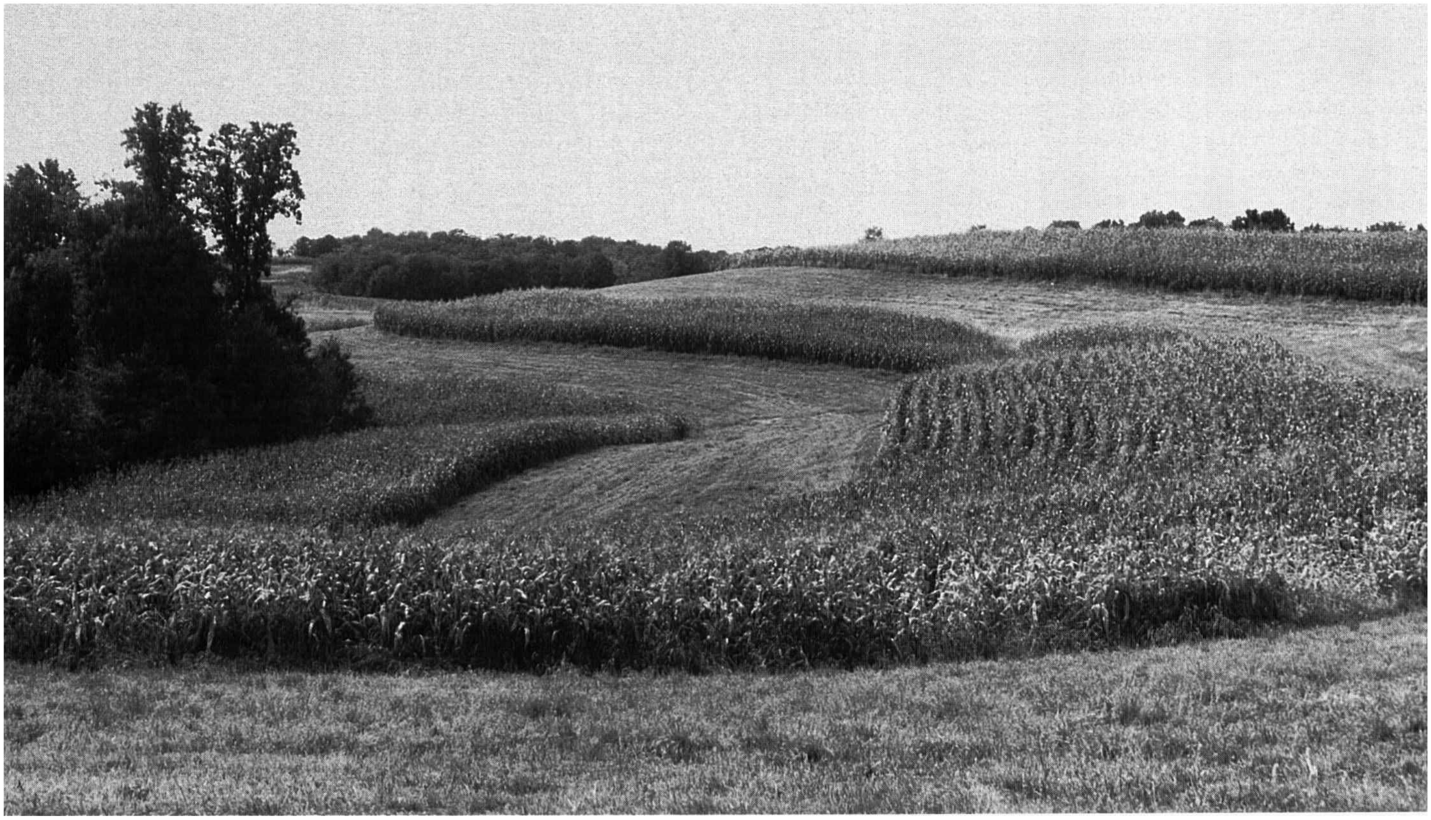

Figure 4.—Contour stripcropping in an area of Aaron silt loam, 15 to 25 percent slopes, eroded.

The root zone is deep. A seasonal high water table is perched in the lower part of the subsoil during extended wet periods. The potential for frost action is high. The shrink-swell potential is high in the subsoil.

Most areas of this soil are used as pasture. Many areas are wooded. A few areas are used for hay.

This soil is poorly suited to cultivated crops. Most areas are significantly eroded, and controlling further erosion is the main management concern. The hazard of erosion is very severe in cultivated areas. Maintaining a permanent plant cover is the best means of controlling erosion. If the soil is cultivated, surface crusting after rains reduces the rate of water infiltration and retards the emergence of seedlings. Using a system of conservation tillage, such as no-till farming, that leaves crop residue on the surface, including grasses and legumes in the cropping system, planting cover crops, tilling on the contour, stripcropping, and establishing grassed waterways can reduce the hazard of erosion (fig. 4). Limiting fieldwork when the surface layer and subsoil are too wet helps to minimize compaction. Using subsurface drains in seepy areas can increase crop production in most years, but the drains should be closely spaced because of the slow permeability.

This soil is only moderately suited to hay and pasture. The clayey subsoil restricts the root development of some forage plants. Frost heave can damage deep-rooted legumes, especially in pure stands. Leaving a protective cover on the surface in the fall and including grasses in the seeding mixture can minimize the damage caused by frost heave. If the soil is plowed, the hazard of erosion is severe. Seeding companion crops, adding mulch, or using no-till seeding methods reduces the hazard of erosion. Restricting grazing during wet periods helps to prevent surface compaction and damage to plant roots. Erosion can be severe in overgrazed pastures.

This soil is only moderately suited to timber production. The aspect of the soil affects the growth of trees. Coves and north- and east-facing slopes are the best woodland sites. They have cooler temperatures and more available water than other sites because they are less exposed to the sun and prevailing winds. The soil has low strength when wet and cannot support heavy equipment. Spreading aggregate on haul roads or log landings helps to stabilize the surface. The slope limits the use of some planting and logging equipment. Establishing roads and skid trails on the contour, establishing water bars, and maintaining a vegetative cover help to control erosion. Where roads and trails cross channels, adding stones helps to prevent gullying. Using planting techniques that spread the roots of seedlings and increase soil-root contact reduces the seedling mortality rate. Using seedlings that have been transplanted once or adding mulch reduces the seedling mortality rate on south-facing slopes. Plant competition can be controlled by removing vines and the less desirable trees and shrubs.

This soil is poorly suited to use as a site for buildings. The slope, the seasonal wetness, the high shrink-swell potential, and the hazard of slippage are management concerns. Designing buildings so that they conform to the natural slope of the land reduces the need for cutting, filling, and land shaping. Cutting and filling increase the hazard of hillside slippage, but installing drains in seepy areas reduces this hazard. Backfilling basement walls with porous material can minimize the damage caused by shrinking and swelling. Waterproofing basement walls and installing drains at the base of footings help to keep basements dry. Removing as little vegetation as possible during construction, mulching, establishing a temporary plant cover on construction sites, building local roads and streets on the contour, and seeding road cuts reduce the hazard of erosion.

This soil is generally unsuited to use as a site for septic tank absorption fields because of the seasonal wetness, the slow permeability, and the slope. These problems are difficult to overcome.

Ponds can be developed in some of the draws in areas of this soil. The soil material packs well only if it has the right moisture content. Layers of shattered or porous rock, which can permit excessive seepage, are on the sides of some draws. Onsite investigation is needed to locate these layers.

The land capability classification is IVe. The pasture and hayland suitability group is A-2. The woodland ordination symbol is 4R.

AcB—Aaron-Upshur complex, 2 to 6 percent slopes. These deep, gently sloping soils are on ridgetops and benches. Slopes are smooth and convex. Most areas are long and oval and range from 5 to 30 acres in size. They are about 45 percent Aaron soil and 30 percent Upshur soil. The two soils occur as areas so closely intermingled that it is impractical to map them separately.

The Aaron soil is moderately well drained. Typically, the surface layer is dark grayish brown, friable silt loam about 7 inches thick. The subsoil is about 37 inches thick. The upper part is yellowish brown, friable silty clay loam. The lower part is dark yellowish brown, mottled, firm silty clay. Light brownish gray, weathered clay shale bedrock is at a depth of about 44 inches. Some areas are well drained.

The Upshur soil is well drained. Typically, the surface layer is reddish brown, friable silty clay loam about 7 inches thick. The subsoil is reddish brown and dark reddish brown, firm silty clay about 43 inches thick. The underlying material to a depth of 72 inches or more is dark reddish brown, firm shaly silty clay. In some areas the surface layer is silt loam.

Included with these soils in mapping are small areas of the moderately deep Gilpin soils. These included soils are on shoulder slopes and the higher parts of ridgetops. Also included are areas of the silty Westgate soils and areas of somewhat poorly drained soils on the flatter part of ridgetops. Included soils make up about 25 percent of most delineations.

Permeability is slow in the Aaron and Upshur soils. Runoff is medium. Available water capacity is moderate, and the root zone is deep. The content of organic matter is moderately low in the surface layer of the Aaron soil and moderately low or low in the surface layer of the Upshur soil. A seasonal high water table is perched in the lower part of the subsoil of the Aaron soil in late winter and in spring and during other extended wet periods. In both soils the shrink-swell potential is high in the lower part of the subsoil and in the underlying material.

Most areas are used as cropland or pasture. Some areas are wooded.

These soils are well suited to cultivated crops. Erosion is the main management concern. The hazard of erosion is moderate in cultivated areas. If the soils are cultivated, surface crusting after rains reduces the rate of water infiltration and retards the emergence of seedlings. Using a system of conservation tillage, such as no-till farming, that leaves crop residue on the surface, including grasses and legumes in the cropping system, planting cover crops, tilling on the contour, and establishing grassed waterways can reduce the hazard of erosion. The clayey subsoil dries slowly and warms up slowly in the spring. Limiting fieldwork when the surface layer and subsoil are too wet helps to minimize compaction. Using subsurface drains can reduce wetness in scattered low areas, but the drains should be closely spaced because of the slow permeability in the subsoil.

These soils are well suited to hay and pasture. The clayey subsoil restricts the root development of some plant species. Frost heave can damage deep-rooted legumes, especially in pure stands. Leaving a protective cover on the surface in the fall or seeding a grass-legume mixture can minimize the damage caused by frost heave. If the soils are plowed, the hazard of erosion is moderate. Seeding companion crops, adding mulch, or using no-till seeding methods can reduce the hazard of erosion.

These soils are well suited to timber production. No major limitations affect the planting or growth of most species, but the clayey subsoil restricts the root development of some species. Because of low strength, the soils cannot support heavy equipment during wet periods. Spreading aggregate on haul roads or log landings helps to stabilize the surface. Plant competition can be controlled by removing vines and the less desirable trees and shrubs.

These soils are only moderately suited to building site development. The seasonal wetness is a limitation in areas of the Aaron soil. The high shrink-swell potential of both soils is a limitation on sites for dwellings, especially dwellings with basements. Waterproofing basement walls and installing drains at the base of footings help to keep basements dry. Reinforcing walls with pilasters and concrete, supporting the walls with a large spread footing, and backfilling around foundations with material that has a low shrink-swell potential help to minimize the damage caused by shrinking and swelling. Using sedimentation basins and maintaining a continuous plant cover help to control erosion and runoff on construction sites.

Because of the seasonal wetness in the Aaron soil and the slow permeability in both soils, areas of this map unit are poorly suited to septic tank absorption fields. Perimeter drains can be used to reduce the wetness, but they are only moderately effective because of the slow permeability. Elevating the field with more permeable fill helps to overcome the slow permeability.

The watershed area for ponds is limited because of the ridgetop landscape position of the soils. Excavated ponds can hold water unless porous or shattered rock layers below the clay beds are exposed. Onsite investigation is needed to determine the thickness of the clayey soil material.

The land capability classification is IIe. The pasture and hayland suitability group is A-6 for the Aaron soil and F-5 for the Upshur soil. The woodland ordination symbol is 4C for the Aaron soil and 3C for the Upshur soil.

AfB—Alford silt loam, 2 to 8 percent slopes. This deep, gently sloping, well drained soil is on knolls and in saddles on ridgetops and terraces in areas of thick, silty windblown deposits. Most areas are long and narrow and range from 5 to 30 acres in size.

Typically, the surface layer is brown, friable silt loam about 10 inches thick. The subsoil is about 40 inches thick. It is yellowish brown, friable silt loam and is mottled in the lower part. The underlying material to a depth of 80 inches or more is yellowish brown, mottled, friable silt loam. In some areas the soil is moderately well drained. In a few areas the soil is eroded. In places the underlying material is loam or fine sandy loam.

Included with this soil in mapping are Zanesville soils on the wider parts of ridgetops. These soils have a fragipan. Also included are somewhat poorly drained soils in drainageways and a few areas that have bedrock within a depth of 6 feet. Included areas make up about 15 percent of most delineations.

Permeability is moderate in the Alford soil. Runoff is medium. Available water capacity is high. The content of organic matter in the surface layer is moderately low. The capacity to store and release plant nutrients is moderate. The potential for frost action is high.

Most areas are used as cropland. Some areas are used as pasture or as sites for homes. A few areas are wooded.

This soil is well suited to cultivated crops, including specialty crops. In cultivated areas the hazard of erosion is moderate. If the soil is cultivated, surface crusting after rains reduces the rate of water infiltration and hinders the emergence of seedlings. Using a system of conservation tillage, such as no-till farming, that leaves crop residue on the surface, including grasses and legumes in the cropping system, planting cover crops, and tilling on the contour can reduce the hazard of erosion. Limiting fieldwork when the surface layer and subsoil are too wet helps to minimize compaction.

This soil is well suited to hay and pasture. A wide variety of forage plants can be planted. Frost heave can damage deep-rooted legumes, especially in pure stands. Leaving a protective cover on the surface in the fall or including grasses in the seeding mixture can minimize the damage caused by frost heave. If the soil is plowed, the hazard of erosion is moderate. Seeding companion crops, adding mulch, or using no-till seeding methods reduces the hazard of erosion.

This soil is well suited to timber production, but only a small acreage is used as woodland. The native trees are mostly white oak, red oak, black cherry, yellow-poplar, and shagbark hickory. The soil has low strength when wet and cannot support heavy equipment. Spreading aggregate on haul roads or log landings helps to stabilize the surface.

This soil is well suited to use as a site for buildings. Shrinking and swelling of the subsoil is the main limitation. Damage to walls and foundations can be minimized by backfilling with granular soil material.

Maintaining a plant cover during construction helps to control erosion. The soil is well suited to septic tank absorption fields, and few limitations affect this use.

There are few natural pond sites. Excavated ponds are likely to have an excessive seepage rate.

The land capability classification is IIe. The pasture and hayland suitability group is A-6. The woodland ordination symbol is 5A.

AfC2—Alford silt loam, 8 to 15 percent slopes, eroded. This deep, strongly sloping, well drained soil is on the shoulder slopes of ridgetops or on dissected terraces along broad valleys. Erosion has removed part of the original surface layer, and the present surface layer contains some subsoil material. Most areas are oblong or are irregular in shape and range from 15 to 40 acres in size.

Typically, the surface layer is yellowish brown, friable silt loam about 10 inches thick. The subsoil is about 38 inches thick. It is yellowish brown, friable silt loam. The underlying material to a depth of 60 inches or more is yellowish brown, firm silt loam. In some areas the soil is moderately well drained. In a few areas the surface is not eroded. Other areas have gullies. In places the underlying material is loam, fine sandy loam, or silty clay loam at a depth of more than 40 inches.

Included with this soil in mapping are small areas of Zanesville soils on narrow benches. These soils have a fragipan. Also included are somewhat poorly drained soils in drainageways and a few areas that have bedrock within a depth of 6 feet. Included areas make up about 20 percent of most delineations.

Permeability is moderate in the Alford soil. Runoff is rapid. Available water capacity is high. The content of organic matter is low in the surface layer. The root zone is deep. The capacity to retain and release plant nutrients is moderate. The potential for frost action is high.

Most areas are used as cropland or pasture. Some areas are wooded.

This soil is only moderately suited to cultivated crops. Many areas are significantly eroded, and controlling further erosion is the main management concern. The hazard of erosion is severe in cultivated areas. If the soil is cultivated, surface crusting after rains reduces the rate of water infiltration and retards the emergence of seedlings. Using a system of conservation tillage, such as no-till farming, that leaves crop residue on the surface, including grasses and legumes in the cropping system, planting cover crops, tilling on the contour, stripcropping, and establishing grassed waterways can reduce the hazard of erosion. Limiting fieldwork when the surface layer and subsoil are too wet helps to minimize compaction.

This soil is well suited to hay and pasture. A wide variety of forage plants can be used. Frost heave can damage deep-rooted legumes, especially in pure stands. Leaving a protective cover on the surface in the fall and seeding a grass-legume mixture can reduce the damage caused by frost heave. If the soil is plowed, the hazard of erosion is moderate. Seeding companion crops, adding mulch, or using no-till seeding methods reduces the hazard of erosion.

This soil is well suited to timber production, but only a small acreage is used as woodland. The native trees are mostly white oak, red oak, black cherry, yellow-poplar, and shagbark hickory. The soil has low strength when wet and cannot support heavy equipment. Spreading aggregate on haul roads or log landings helps to stabilize the surface.

This soil is well suited to building site development. The slope, the shrink-swell potential, and low strength are the main management concerns. Low strength can be overcome by using reinforced foundations and a suitable base material. Maintaining as much cover as possible on the site during construction reduces the hazard of erosion. The damage to walls and foundations caused by shrinking and swelling can be minimized by backfilling with granular soil material.

This soil is only moderately suited to septic tank absorption fields. The slope is a management concern. Installing the distribution lines across the slope can minimize the downslope seepage of effluent.

The potential for ponds is poor on this soil. The soil material does not pack well, and it is poor fill. Excavated ponds are likely to have excessive seepage.

This soil is recognized as farmland of local importance. The land capability classification is IIIe. The pasture and hayland suitability group is A-6. The woodland ordination symbol is 5A.

BeB—Berks channery silt loam, 2 to 8 percent slopes. This moderately deep, gently sloping, well drained soil is on upland shoulder slopes and narrow ridgetops. Stones are common on the surface. Most areas are long and narrow and range from 5 to 15 acres in size.

Typically, the surface layer is dark grayish brown, friable channery silt loam about 8 inches thick. The subsoil is yellowish brown, friable very channery and extremely channery silt loam about 21 inches thick. Weathered, fine grained sandstone or siltstone bedrock is at a depth of about 29 inches. Some areas are strongly sloping. In places the surface layer is sandy loam or loam or is very channery.

Included with this soil in mapping are areas of Rigley soils. These soils are deep and are less stony than the Berks soil. They are underlain by coarse grained sandstone bedrock. Also included are areas where bedrock is at a depth of less than 20 inches. Included areas make up about 20 percent of most delineations.

Permeability is moderate or moderately rapid in the Berks soil. Runoff from cultivated areas is medium. Available water capacity is very low. The root zone is restricted by the moderate depth to bedrock. The content of organic matter in the surface layer and the capacity to store and release plant nutrients are low.

Most areas are used as pasture. Only a few areas are used as cropland. Some areas are wooded.

This soil is only moderately suited to cultivated crops. In cultivated areas the hazard of erosion is moderate. The soil is droughty, and crops suffer from insufficient moisture. Droughtiness, erosion, tilth, and the content of organic matter are management concerns. Using no-till farming methods or a system of conservation tillage that leaves crop residue on the surface conserves moisture and helps to control erosion, improves tilth, and increases the content of organic matter. Including grasses and legumes in the cropping system, stripcropping on the contour, and planting cover crops also reduce the hazard of erosion. The channers in the surface layer restrict the use of some tilling and harvesting machinery and interfere with the emergence of seedlings.

This soil is well suited to hay and pasture. The root zone of some species is restricted by bedrock. The soil warms up early in spring and is well suited to early season pasture. Droughtiness reduces the production of forage plants later in the growing season. Drought-resistant species are the most suitable for planting. If the soil is plowed, the hazard of erosion is moderate. Seeding companion crops, adding mulch, or using no-till seeding methods reduces the hazard of erosion. Companion crops, however, compete with forage plants for the limited supply of moisture.

This soil is only moderately suited to timber production. The growth rate of trees is slowed by droughtiness. Coarse fragments in the soil affect the planting and growth of trees. Using seedlings that have been transplanted once and mulching around the seedlings can reduce the seedling mortality rate.

This soil is only moderately suited to use as a site for buildings and is poorly suited to septic tank absorption fields because of the depth to bedrock. The bedrock is at a depth of 20 to 40 inches and is a limitation on sites for buildings with basements. The siltstone bedrock commonly is rippable to a depth of a few feet. Maintaining a vegetative cover on the surface helps to minimize runoff and erosion on construction sites. Because of the limited depth to bedrock, the soil does not adequately filter the effluent in septic tank absorption fields. The effluent enters cracks in the underlying bedrock. It can move considerable distances and pollute ground water. Filtration can be increased by placing the lines on the surface and covering them with soil from another area. An aerator or an alternative system can be used.

There are few natural pond sites. Excavated ponds are very unlikely to hold water.

The land capability classification is IIe. The pasture and hayland suitability group is F-1. The woodland ordination symbol is 4F.

BeD2—Berks channery silt loam, 15 to 25 percent slopes, eroded. This moderately deep, moderately steep, well drained soil is on bluffs, in ravines, or on dissected hillsides on uplands. Sandstone and siltstone stones and boulders are common on the surface. Erosion has removed part of the original surface layer. Individual areas are long and narrow and range from 5 to 80 acres in size.

Typically, the surface layer is brown, friable channery silt loam about 8 inches thick. The subsoil is yellowish brown, firm very channery silt loam about 27 inches thick. Fractured, soft siltstone bedrock is at a depth of about 35 inches. In severely eroded areas, the surface layer is very channery. In some areas the soil is deeper over bedrock.

Included with this soil in mapping are small areas of the deep, moderately well drained Guernsey and Coshocton soils. These soils are in slightly concave landscape positions. Also included are a few seeps and springs and a few bedrock outcrops. Included areas make up about 20 percent of most delineations.

Permeability is moderate or moderately rapid in the Berks soil. Runoff is rapid. Available water capacity is very low. The content of organic matter is moderately low in the surface layer. The root zone generally is restricted by bedrock. The capacity to store and release plant nutrients is low.

This soil is used as pasture or woodland. The native trees are mostly drought-tolerant chestnut oak, black oak, and hickory.

This soil is poorly suited to cultivated crops and hay. Erosion and droughtiness are the major management concerns. The hazard of erosion is very severe in cultivated areas. Using no-till farming methods or a system of conservation tillage that leaves crop residue on the surface helps to control erosion and conserves moisture. Including grasses and legumes in the cropping system, stripcropping on the contour, and planting cover crops also help to control erosion. The channers in the surface layer restrict the use of some tilling and harvesting machinery. Maintaining a permanent plant cover is the best means of controlling erosion. Drought-resistant forage plants are the best suited. More moisture is available for seed germination in the spring than later in the growing season.

This soil is only moderately suited to pasture. The root zone is restricted by bedrock. The soil warms up early in spring and produces good early season pasture. Forage production is reduced by droughtiness later in the growing season. If the soil is plowed, the hazard of erosion is severe. Seeding companion crops, adding mulch, or using no-till seeding methods reduces the hazard of erosion. Erosion can be severe in overgrazed pastures.

This soil is only moderately suited to timber production. The aspect of the slope and the coarse fragments in the soil affect the planting and growth of trees. Coves and north- and east-facing slopes are the best woodland sites. They have cooler temperatures and more available water than other sites because they are less exposed to the sun and prevailing winds. The slope limits the use of planting and logging equipment. Establishing roads and skid trails on the contour, establishing water bars, and maintaining a vegetative cover help to control erosion. Where roads and trails cross channels, adding stones helps to prevent gullying. Using seedlings that have been transplanted once and mulching around the seedlings can reduce the seedling mortality rate, especially on south-facing slopes.

This soil is poorly suited to use as a site for buildings. The slope is the main concern on building sites. Designing buildings so that they conform to the natural slope of the land commonly reduces the need for excavation. Generally, the underlying bedrock is rippable to a depth of a few feet. Maintaining a vegetative cover on the surface helps to control runoff and erosion during construction.

This soil is generally unsuited to septic tank absorption fields because of the depth to bedrock and the slope. Because of the limited depth to bedrock, the soil does not adequately filter the effluent in septic tank absorption fields. The effluent that enters the fractured bedrock can pollute ground water.

Ponds developed in areas of this soil are very likely to have an excessive seepage rate.

The land capability classification is IVe. The pasture and hayland suitability group is F-1. The woodland ordination symbol is 4R on north aspects and 3R on south aspects.

BeE—Berks channery silt loam, 25 to 40 percent slopes. This moderately deep, steep, well drained soil is on bluffs, in ravines, or on the dissected parts of hillsides. In many areas the soil forms a bluff at the top of a long hillside. Stones and rock outcrops of sandstone and siltstone are common. Slopes are irregular, and benches and spurs are in some areas. Most areas occur as thin bands that range from 5 to 45 acres in size.

Typically, the surface layer is very dark grayish brown, friable channery silt loam about 6 inches thick. The subsoil is about 21 inches thick. It is brown and yellowish brown, firm channery and very channery silt loam. Below this to a depth of 60 inches or more is grayish brown, very firm, weathered siltstone and hard siltstone bedrock. In some areas the subsoil contains more clay and fewer coarse fragments. In other areas the bedrock is at a depth of less than 20 inches. Rock outcrops are common along streams.

Included with this soil in mapping are small areas of Guernsey, Coshocton, Lowell, Westmoreland, and Rigley soils. The deep, moderately well drained Guernsey and Coshocton soils are in slightly concave landscape positions. A few seeps, springs, and slips are associated with these soils. The deep Lowell, Westmoreland, and Rigley soils are in the less sloping areas. Also included are areas in the flood pools of the Dillon Lake dam and the Wills Creek dam that are subject to controlled flooding. Included areas make up about 20 percent of most delineations.

Permeability is moderate or moderately rapid in the Berks soil. Runoff is very rapid. Available water capacity is very low. The content of organic matter is moderately low in the surface layer. Generally, the root zone is restricted by bedrock at a depth of 20 to 40 inches.

Most areas are used as woodland. Some areas are used as pasture.

This soil is generally unsuited to cultivated crops and hay because of the steep slopes and a very severe hazard of erosion. Maintaining a permanent plant cover is the best means of controlling erosion.

This soil is poorly suited to pasture. The roots of some species are restricted by bedrock. The soil warms up early in spring and is well suited to early season pasture. Forage production is reduced by droughtiness later in the growing season. Adding mulch or using no-till seeding methods reduces the hazard of erosion.

This soil is moderately suited to timber production. The aspect of the slope and the coarse fragments in the soil affect the planting and growth of trees. Coves and north- and east-facing slopes are the best woodland sites. They have cooler temperatures and more available water than other sites because they are less exposed to the sun and prevailing winds. The slope limits the use of planting and logging equipment. Establishing roads and skid trails on the contour, establishing water bars, and maintaining a vegetative cover help to control erosion. Where roads and trails cross channels, adding stones helps to prevent gullying. Using seedlings that have been transplanted once and mulching around the seedlings can reduce the seedling mortality rate, especially on south-facing slopes.

This soil generally is unsuited to use as a site for buildings or septic tank absorption fields because of the slope and the depth to bedrock. Ponds developed in areas of this soil are likely to have excessive seepage.

The land capability classification is VIe. The pasture and hayland suitability group is F-2. The woodland ordination symbol is 4R on north aspects and 3R on south aspects.

BkF—Berks-Westmoreland complex, 40 to 70 percent slopes. These moderately deep and deep, well drained soils are on dissected, very steep hillsides along the larger stream valleys. Areas of this unit have the most rugged terrain in the county. Some areas form the side slopes of narrow hollows or ravines along the smaller streams or tributaries. Some slopes are benched. Springs at the upper edge of some of the benches cause seepage downslope. Stones and massive outcrops of sandstone form bluffs or ledges in some areas. Most areas are long and narrow and range from 20 to 500 acres in size. They are about 40 percent Berks soil and 35 percent Westmoreland soil. The Berks soil is on the steeper, upper parts of hillsides, and the Westmoreland soil is on the less sloping, lower parts. The two soils are so closely intermingled that it is impractical to map them separately.

Typically, the surface layer and subsurface layer of the Berks soil are very dark gray and brown, friable channery silt loam about 10 inches thick. The subsoil is about 12 inches thick. It is yellowish brown, firm very channery silt loam. Fractured, fine grained sandstone bedrock is at a depth of about 22 inches.

Typically, the surface layer of the Westmoreland soil is brown, friable silt loam about 4 inches thick. The subsoil is about 40 inches thick. It is yellowish brown channery silty clay loam. Fractured, weathered, fine grained sandstone and siltstone bedrock is at a depth of about 44 inches. In some areas, stones and boulders are on the surface and the surface layer and subsoil are sandy loam.

Included with these soils in mapping are areas of the moderately well drained Brookside, Coshocton, and Guernsey soils and areas of Lobdell soils. Brookside, Coshocton, and Guernsey soils are on the less sloping benches. Gullies, landslides, and soil-creep zones are common. Lobdell soils are on narrow flood plains along streams. Also included are areas in the flood pools of the Dillon Lake or Wills Creek dam that are subject to controlled flooding and areas of severely eroded soils that are shallow over bedrock and are very channery throughout. Included areas make up about 25 percent of most delineations.

Permeability is moderate or moderately rapid in the Berks soil and moderate in the Westmoreland soil. Runoff is very rapid on both soils. Available water capacity is very low in the Berks soil and moderate in the Westmoreland soil. The content of organic matter is low in the Berks soil and moderately low in the Westmoreland soil. The depth of the root zone is determined by the depth to bedrock. It ranges from 20 inches in the Berks soil to more than 40 inches in the Westmoreland soil. The capacity to retain and release plant nutrients is low in the Berks soil and moderate in the Westmoreland soil.

Most areas of these soils are wooded. Native trees are mostly drought-tolerant chestnut oak, black oak, and hickory in areas of the Berks soil and red oak, yellow-poplar, and maple in areas of the Westmoreland soil.

These soils are generally unsuited to cropland and pasture because of the slope and a very severe hazard of erosion. Slopes are too steep for the safe operation of farm machinery. Maintaining a permanent cover of plants is the best means of controlling erosion.

These soils are moderately suited to timber production. The aspect of the slope and the coarse fragments in the soils affect the planting and growth of trees. Coves and north- and east-facing slopes are the best woodland sites. They have cooler temperatures and more available water than other sites because they are less exposed to the sun and prevailing winds. The slope limits the use of planting and logging equipment. Downslope slippage of mature trees is a problem in some areas. Establishing roads and skid trails on the contour, establishing water bars, and maintaining a vegetative cover help to control erosion. Where roads and trails cross channels, adding stones helps to prevent gullying. Using seedlings that have been transplanted once and mulching around the seedlings can reduce the seedling mortality rate, especially on south-facing slopes. Plant competition on the Westmoreland soil can be controlled by removing vines and the less desirable trees and shrubs.

These soils are generally unsuited to use as sites for buildings or for septic tank absorption fields because of the very steep slopes. The use of equipment is unsafe because of the slope. Cuts made in areas used as building sites may cause landslips. Excessive downslope seepage of effluent is likely in areas used for septic tank absorption fields.

Some areas of these soils have scenic ravines, rock ledges, and bluffs. The potential for ponds is poor because shattered rock is close to the surface on the side slopes of small valleys. The valley bottoms are steep, and a high fill is needed to create a water impoundment of any size.

The land capability classification is VIIe. The pasture and hayland suitability group is H-1. The woodland ordination symbol for the Berks soil is 4R on north aspects and 3R on south aspects. It is 4R for the Westmoreland soil.

BoB—Bethesda shaly silt loam, 1 to 15 percent slopes. This deep, nearly level to strongly sloping, well drained soil is on excavated mine spoil in areas that have been surface-mined for coal. The mine spoil has been graded. The surface commonly is a leveled ridgetop or bench below the former highwall. Rills and gullies are common. The soil is a mixture of rock fragments and partially weathered fine earth material that was in or below the profile of the original soil. The rock fragments are mainly shale, siltstone, and sandstone but include small amounts of coal and carbonaceous shale. There are few stones on the surface. Most areas are irregular in shape and range from 10 to 140 acres in size.

Typically, the surface layer is dark grayish brown, friable shaly silt loam about 1 inch thick. The underlying material to a depth of 60 inches or more is multicolored, friable very shaly silty clay loam, extremely channery clay loam, very channery clay loam, very channery loam, and very channery silty clay loam. In some areas the soil is less acid and has a thin surface layer that is not shaly. The soil is ultra acid in areas where coal fragments are abundant. These areas are toxic to vegetation and are severely eroded.

Included with this soil in mapping are narrow strips of Gilpin, Rigley, and Westmoreland soils. These soils are in unmined areas. They make up about 20 percent of most delineations.

Permeability is moderately slow in the Bethesda soil. Runoff is medium. Available water capacity is low. The content of organic matter is very low. Tilth is poor. The root zone ranges from very shallow to moderately deep, depending on the density of the underlying material.

Most areas are abandoned or are used as wildlife habitat. Some areas are used as pasture. In most areas that were formerly mined, black locust, European alder, and other acid-tolerant trees and shrubs have been planted or a mixture of grasses has been established.

This soil is generally unsuited to row crops and small grain and is poorly suited to hay because of the acidity and the restricted root zone. It is droughty and low in fertility. The surface layer is shaly, has weak structure, and crusts easily. The hazard of erosion is very severe if the soil is cultivated. Maintaining a permanent plant cover is the best means of controlling erosion. Because of uneven grading and settling, surface drainage may be needed in some areas.

This soil is poorly suited to pasture. Extreme acidity and droughtiness limit the number of suitable plants. The soil remains soft until late spring. Grazing when the soil is soft can damage plant roots. If the soil is cultivated, the hazard of erosion is moderate. Seeding companion crops, adding mulch, or using no-till seeding methods reduces the hazard of erosion.

This soil is poorly suited to timber production. It supports planted black locust and pine and some volunteer hardwoods in a few areas. Species that can tolerate acidity, droughtiness, and a restricted root zone should be selected for planting. Rock fragments throughout the soil interfere with the use of mechanical tree planters. Maintaining a cover of grasses and legumes helps to control erosion before trees are established.

This soil is poorly suited to building site development. Uneven settling of the mine spoil can occur for several years after mining and grading and can cause extensive damage to foundations. Steel and concrete structures in the soil may deteriorate because of the acidity. Removing as little vegetation as possible, mulching, and establishing a temporary plant cover can minimize erosion during construction. Sites for lawns should be blanketed with soil material from another area.

After it has settled, this soil is only poorly suited to septic tank absorption fields. Enlarging the leach field or using a double field can help to overcome the restricted permeability. The larger rock fragments should be excluded from backfill over the leach lines. The acid soil may cause the deterioration of cement tanks.

Ponds can be excavated in some natural depressions. The ability of the ponds to hold water is variable. In some places, water for ponds is too acid for fish and may irritate the skin.

The land capability classification is VIs. The pasture and hayland suitability group is E-3. No woodland ordination symbol is assigned.

BoD—Bethesda shaly silt loam, 15 to 25 percent slopes. This deep, moderately steep, well drained soil is on the ridgetops and benches of excavated mine spoil in areas that have been surface-mined for coal. It is a mixture of rock fragments and partially weathered fine earth material. There are a few channers on the surface in most areas. The channers are mostly flat and are 1 to 5 inches long. They are mainly shale, siltstone, and fine grained sandstone but include a small amount of coal and carbonaceous shale. Slopes are dissected by gullies. Some areas have a highwall remaining at the upper edge. Areas range from 5 to 50 acres in size.

Typically, the surface layer is dark grayish brown, friable shaly silt loam about 5 inches thick. The underlying material to a depth of 60 inches or more is yellowish brown and brown, firm and very firm very channery loam, very channery silty clay loam, and extremely channery clay loam. The content of shale, sandstone, siltstone, and coal in the underlying material ranges from about 35 to 70 percent. In some areas the soil is ultra acid and is toxic to plants.

Included with this soil in mapping are narrow strips of Gilpin, Rigley, and Westmoreland soils. These soils are in unmined areas. Also included are a few extremely stony and bouldery areas and narrow, very steep escarpments. Included areas make up about 20 percent of most delineations.

Permeability is moderately slow in the Bethesda soil. Runoff from unprotected areas is rapid or very rapid. Available water capacity is low because of the high content of coarse fragments and the high density of the underlying material. The content of organic matter is very low. The root zone ranges from very shallow to moderately deep, depending on the density of the underlying material.

Most areas are abandoned or are used as wildlife habitat. A few areas are used as pasture. In most areas that were formerly mined, black locust, European alder, and other acid-tolerant trees and shrubs have been planted. Grasses have been established in some areas.

This soil is unsuited to the commonly grown field crops and hay because it is a poor medium for root development. It is droughty, is low in fertility, and has a very low content of organic matter. The surface layer is shaly, has weak structure, and crusts easily. Much of the rainfall runs off because of the poor soil structure and a lack of plant cover. The hazard of erosion is severe or very severe in areas that are not protected by a vegetative cover. The rock fragments in the surface layer interfere with tillage.

This soil is poorly suited to pasture. Droughtiness and acidity limit the number of suitable forage species. Production is very low during dry periods. The soil remains soft until late spring. Grazing when the soil is soft can damage plant roots. If the soil is cultivated, the hazard of erosion is moderate. Seeding companion crops, adding mulch, or using no-till seeding methods reduces the hazard of erosion. Areas that have not had regular applications of lime and fertilizer support only thin stands of grasses and have many barren spots in which rills and gullies can form. Generally, the content of nitrogen and phosphorus is low and the content of potassium is medium. Water for livestock is not available in many areas.

This soil is poorly suited to timber production, but maintaining a cover of trees helps to prevent erosion. The soil supports planted black locust and pine and some volunteer hardwoods in a few areas. Species that can tolerate acidity, droughtiness, and a restricted root zone should be selected for planting. The slope and the rock fragments throughout the profile interfere with the use of planting and logging equipment. Maintaining a cover of grasses and legumes helps to control erosion before trees are established. Coves and north- and east-facing slopes are the best woodland sites. They have cooler temperatures and more available water than other sites because they are less exposed to the sun and prevailing winds.

This soil is generally unsuited to use as a site for buildings because of uneven settlement, susceptibility to slippage, and a very severe hazard of erosion. The soil also is unsuited to septic tank absorption fields because of the moderately slow permeability, the slope, and uneven settlement.

Ponds can be developed in some natural depressions, but the ability of the ponds to hold water varies considerably.

The land capability classification is VIs. The pasture and hayland suitability group is E-3. No woodland ordination symbol is assigned.

BpF—Bethesda flaggy silt loam, 25 to 70 percent slopes. This deep, steep and very steep, well drained soil is in areas that have been surface-mined for coal. It consists of ungraded mine spoil on ridges and in trenches that follow the contour of the land. The soil material is a mixture of rock fragments and partially weathered fine earth material that was in or below the profile of the original soil. Many flagstones, boulders, and coarse, mostly flat fragments are on the surface. They are mainly shale, siltstone, and sandstone but include small amounts of coal and carbonaceous shale. Erosion is severe, and rills and gullies are common. Slopes are irregular. Individual areas of this soil are long and narrow and range from 20 to 200 acres in size.

Typically, the surface layer is dark grayish brown, friable flaggy silt loam about 10 inches thick. The underlying material to a depth of 60 inches or more is variegated dark grayish brown, grayish brown, and gray. The upper part is firm channery silty clay loam, and the lower part is firm very channery silty clay loam. Some areas are less sloping, have been graded, and are not so susceptible to erosion.

Included with this soil in mapping are Morristown soils and a few areas of the loamy Udorthents. Morristown soils are in areas where the mine spoil is alkaline. Udorthents have fewer coarse fragments and a higher available water capacity than the Bethesda soil. Also included are some small areas of mine dumps and pits that are toxic to plants and pools of shallow water between ridges and along vertical rock highwalls. Included areas make up about 20 percent of most delineations.

Permeability is moderately slow in the underlying material of the Bethesda soil. Runoff is very rapid. Available water capacity is low. The content of organic matter is very low in the surface layer. The root zone ranges from very shallow to moderately deep, depending on the density of the underlying material. The capacity to store and release nutrients is very low.

This soil is generally unsuited to crops, hay, and pasture because of the slope, droughtiness, and extrême acidity. In most areas, black locust trees have been planted or other trees and briers have been naturally reseeded. Some areas are barren or are sparsely vegetated.

This soil is poorly suited to timber production. It is best suited to trees that can tolerate acidity, droughtiness, and a restricted root zone. The use of equipment is restricted because of the slope.

This soil is unsuited to building site development and septic tank absorption fields because of the slope, the moderately slow permeability, and uneven settlement. Cutting and filling increase the hazard of slippage.

Areas of this soil are poorly suited to use as sites for ponds. Water in the ponds is acid and has a high content of sediment.

The land capability classification is VIIe. The pasture and hayland suitability group is H-1. No woodland ordination symbol is assigned.

BsC2—Brookside silty clay loam, 8 to 15 percent slopes, eroded. This deep, strongly sloping, moderately well drained soil is on benches and foot slopes on and below steep and very steep, dissected hillsides. Erosion has removed part of the original surface layer, and the present surface layer is a mixture of material from the original surface layer and the subsoil. Gullies, landslides, and seeps are common. Most areas are long and narrow and range from 10 to 90 acres in size.

Typically, the surface layer is brown, friable silty clay loam about 7 inches thick. The subsoil is about 32 inches thick. The upper part is light olive brown, firm silty clay and brown, firm clay. The lower part is weak red and olive gray, mottled, firm clay. The underlying material to a depth of 78 inches or more is light olive brown and light olive gray, firm silty clay. In some severely eroded areas, the surface layer is silty clay and mottles are closer to the surface. In some places the subsoil is thinner and is underlain by weathered clay shale.

Included with this soil in mapping are small areas of Upshur, Gilpin, Claysville, and Westgate soils. The well drained Upshur soils have a reddish brown subsoil. The moderately deep Gilpin soils are on the shoulders of slopes. The somewhat poorly drained Claysville soils are at the head of drainageways. Westgate soils are in the less sloping areas. They are less clayey than the Brookside soil. Included soils make up about 20 percent of most delineations.

Permeability is moderately slow in the Brookside soil. Runoff is rapid. Available water capacity is moderate. The content of organic matter is moderately low in the surface layer. The root zone is deep. The shrink-swell potential is high. A seasonal high water table is perched in the lower part of the subsoil during extended wet periods.

Most areas are used for hay or pasture. Some areas that were formerly farmed are sites for active oil or gas wells. Access roads are in these areas.

This soil is moderately suited to cultivated crops. The hazard of erosion is severe in cultivated areas. Tilth is generally poor in eroded areas. Many areas are eroded, and controlling further erosion is the main management concern. If the soil is cultivated, surface crusting after rains reduces the rate of water infiltration and hinders the emergence of seedlings. Using a system of conservation tillage, such as no-till farming, that leaves crop residue on the surface, including grasses and legumes in the cropping system, planting cover crops, tilling on the contour, stripcropping, and establishing grassed waterways can reduce the hazard of erosion. Limiting fieldwork when the surface layer and subsoil are too wet helps to minimize compaction. In some areas the uneven slopes limit the use of equipment. Subsurface drains are needed in scattered seepy areas of the included Claysville soils and in other wet or seepy areas.

This soil is well suited to hay and pasture. It is suited to a wide variety of forage plants. If the soil is plowed, the hazard of erosion is moderate. Seeding companion crops, adding mulch, or using no-till seeding methods reduces the hazard of erosion. Restricting grazing during wet periods helps to prevent compaction of the surface layer. Springs in seepy areas of the included Claysville soils can provide water for livestock.

This soil is well suited to timber production. No major limitations affect the planting or growth of trees. The soil has low strength when wet and cannot support heavy equipment. Spreading aggregate on haul roads or log landings helps to stabilize the surface. Establishing roads and skid trails on the contour, establishing water bars, and maintaining a vegetative cover help to control erosion.

This soil is poorly suited to use as a site for buildings because of the high shrink-swell potential and the hazard of slippage. The hazard of erosion can be reduced by removing as little vegetation as possible, by mulching, and by establishing a temporary plant cover on construction sites. Shrinking and swelling, slippage, and low strength can cause damage to foundations. The damage caused by shrinking and swelling can be minimized by reinforcing concrete walls and foundations and by backfilling with granular soil material. The damage caused by landslides can be prevented by building on more stable soils. The soil is less likely to slide if saturated layers are drained. Tree roots help to stabilize the soil. Drains around footings can reduce the wetness.

This soil is poorly suited to septic tank absorption fields because of seasonal wetness and the moderately slow permeability. Enlarging the absorption field or using a double field can help to overcome the restricted permeability. Perimeter drains can be used to lower the seasonal high water table.

Areas that have distinct seeps and slips should not be used as sites for buildings or septic tank absorption fields.

The potential for ponds is good in areas of this soil. Water generally is plentiful. The soil material is suitable for dam fill if used at the right moisture content.

This soil is recognized as farmland of local importance. The land capability classification is IIIe. The pasture and hayland suitability group is A-1. The woodland ordination symbol is 5A.

BsE—Brookside silty clay loam, 15 to 40 percent slopes. This deep, moderately steep and steep, moderately well drained soil is on benched foot slopes below steep and very steep, dissected hillsides along river valleys. Gullies, landslides, and seeps are common. The microrelief is hummocky in many areas. Boulders and stones are common on the upper part of slopes. Most areas are long and narrow and range from 15 to 80 acres in size.

Typically, the surface layer is dark brown, friable silty clay loam about 3 inches thick. The subsurface layer is brown, friable silty clay loam about 7 inches thick. The subsoil is about 53 inches thick. It is yellowish brown, firm silty clay loam, gravelly silty clay, channery silty clay, and channery silty clay loam. It is mottled in the lower part. The underlying material to a depth of 70 inches or more is very dark grayish brown, mottled, very firm channery silty clay loam. In some areas the soil has reddish brown colors. In places layers of clay shale are at a depth of less than 5 feet. Some areas are eroded.

Included with this soil in mapping are Westmoreland and Westgate soils. Westmoreland soils are in areas of loamy colluvium. Westgate soils are on the narrow, less sloping benches. Also included are many areas where the subsoil has dark reddish brown layers and some areas below sandstone outcrops that have many stones and boulders on the surface. Included areas make up about 25 percent of most delineations.

Permeability is moderately slow in the Brookside soil. Runoff is very rapid. Available water capacity is moderate. The content of organic matter is moderately low or moderate in the surface layer. The root zone is deep. A seasonal high water table is perched in the lower part of the subsoil during extended wet periods. The shrink-swell potential is high in the subsoil. The soil is subject to slippage.

Most areas are used as woodland or pasture.

This soil is generally unsuited to cultivated crops and hay because of the steep, irregular slopes and a very severe hazard of erosion. Maintaining a permanent plant cover is the best means of controlling erosion.

This soil is poorly suited to pasture. It is suited to most of the commonly grown forage plants, but the slope limits seeding and improvement practices. If the soil is plowed, the hazard of erosion is very severe. Seeding companion crops, adding mulch, or using no-till seeding methods reduces the hazard of erosion.

This soil is moderately suited to timber production. The aspect of the slope affects the planting and growth of trees. North- and east-facing slopes are the best woodland sites. They are cooler and moister than south- and west-facing slopes because they are less exposed to the sun and wind. The soil has low strength when wet and cannot support heavy equipment. Spreading aggregate on haul roads or log landings helps to stabilize the surface. Establishing roads and skid trails on the contour, establishing water bars, and maintaining a vegetative cover help to control erosion. Using planting techniques that spread the roots of seedlings and that increase soil-root contact reduces the seedling mortality rate.

This soil is generally unsuited to use as a site for buildings or septic tank absorption fields because of the slope, the moderately slow permeability, the seasonal wetness, the high shrink-swell potential, and the hazard of slippage. The soil is less likely to slide if saturated zones are drained. Tree roots help to stabilize the soil.

This soil is poorly suited to use as a site for ponds. Slips and landslides are likely to cause shifting and cracking of embankments.

The land capability classification is VIe. The pasture and hayland suitability group is A-3. The woodland ordination symbol is 5R on north aspects and 4R on south aspects.

Cb—Chagrin loam, rarely flooded. This deep, nearly level, well drained soil is in the higher areas on flood plains along rivers. It is subject to rare flooding. The flooding is partially controlled by dams on upstream reservoirs of the Muskingum Conservancy District. Slopes range from 0 to 3 percent. Most areas are crescent shaped and range from 20 to 80 acres in size.

Typically, the surface layer is dark grayish brown, friable loam about 12 inches thick. The subsoil is dark yellowish brown, friable silt loam and brown, friable loam and fine sandy loam about 31 inches thick. The underlying material to a depth of 83 inches or more is yellowish brown, loose loamy fine sand and fine sand and very friable sandy loam. In some areas the subsoil has less sand. A few areas are occasionally flooded. In places the soil is moderately well drained. In low areas the surface layer is darker colored and has more organic matter. In some areas the underlying material is moderately rapidly permeable.

Included with this soil in mapping are small areas of Newark, Melvin, Watertown, and Chavies soils. Newark and Melvin soils are on the lower flood plains. Watertown and Chavies soils are on outwash terraces. Included soils make up less than 20 percent of most delineations.

Permeability is moderate in the Chagrin soil. Runoff is slow. Available water capacity is high. On rare occasions, floodwater covers the soil for a few days, usually during the dormant season. Ice jams or other obstructions in stream channels are commonly the cause of the flooding. The content of organic matter is moderate in the surface layer. The root zone is deep. The soil has a moderate capacity to store and release plant nutrients. The water table is usually at a depth of more than 4 feet but is affected by the level of stream flow. The shrink-swell potential is low, and the potential for frost action is moderate.

Most areas are cultivated. A few areas are used as pasture or woodland. The woodland consists mainly of native bottom-land hardwoods.

This soil is well suited to corn, soybeans, and wheat and to specialty crops, such as melons, tomatoes, cucumbers, and potatoes. The soil dries early in the spring and is well suited to irrigation. Conserving soil moisture is the main management concern. The soil is better suited to crops that mature early in the growing season than to late-season crops. Using no-till farming methods or a system of conservation tillage that leaves crop residue on the surface conserves moisture and increases the rate of water infiltration. Banded or split applications of fertilizer minimize the loss of nutrients, especially nitrogen, and help to prevent the pollution of ground water. Limiting fieldwork when the surface layer and subsoil are too wet helps to minimize compaction. In a few areas, land grading allows surface water to drain faster. Keeping stream channels free of obstructions, such as logjams, helps to prevent flooding.

This soil is well suited to hay and pasture. It is suited to a wide variety of forage plants. Most of the hay is grown as part of a rotation that includes cultivated crops. Including legumes in the rotation provides nitrogen for subsequent row crops. Flooding can damage hay seedlings during the winter months. The quality of forage is reduced if flooding occurs during the growing season.

This soil is well suited to timber production, but only a small acreage is used as woodland. No major limitations affect the planting, growth, or harvesting of trees. Native bottom-land hardwoods grow well on this soil. Plant competition can be controlled by removing vines and the less desirable trees and shrubs.

This soil is generally not suited to use as a site for buildings because of the flooding. It is well suited to septic tank absorption fields. The flooding, the restricted permeability, and the seasonal high water table are management concerns. Installing perimeter drains can lower the seasonal high water table. Elevating the field can reduce the hazard of flood damage and increase the depth to the water table. Increasing the size of the absorption field helps to overcome the restricted permeability. Elevating roads, bridges, and sites for recreational facilities above the high water level can minimize the damage caused by flooding. Fill for roads and other structures should not block the flow of floodwater. Levees are used to protect the soil in a few areas, but the levees tend to increase flood damage on nearby unprotected land. Excavated ponds are unlikely to hold water and are subject to flood damage.

The land capability classification is I. The pasture and hayland suitability group is A-5. The woodland ordination symbol is 5A.

CcA—Chavies loam, 0 to 2 percent slopes. This deep, nearly level, well drained soil is on glacial outwash terraces. Most areas are round or oblong and range from 10 to 200 acres in size.

Typically, the surface layer is brown, friable loam about 12 inches thick. The subsoil is about 36 inches thick. The upper part is yellowish brown, firm loam and strong brown, very friable sandy loam. The lower part is strong brown, friable gravelly sandy loam. The underlying material to a depth of 80 inches or more is brown, loose gravelly loamy sand. In places the surface layer is sandy loam or silt loam. Some areas are more gravelly and have a subsoil that contains more clay.

Included with this soil in mapping are areas of Cidermill, Glenford, and Chagrin soils. Cidermill soils are in areas where the surface layer and the upper part of the subsoil are silt loam. The moderately well drained Glenford soils are in areas that receive runoff from adjoining hillsides. Chagrin soils are in low areas that are subject to rare flooding. Also included are areas in the flood pool of the Wills Creek dam that are subject to controlled flooding. Included areas make up about 20 percent of most delineations.

Permeability is moderately rapid in the Chavies soil.

Runoff is slow. Available water capacity is moderate. The content of organic matter is moderate in the surface layer. The root zone is deep. The capacity to store and release plant nutrients is low.

Most areas are used for crops. Some areas are used as pasture or for suburban housing.

This soil is well suited to cultivated crops, including specialty crops. The soil dries early in the spring and is well suited to irrigation. Conserving soil moisture is the main management concern. The soil is better suited to crops that mature early in the growing season than to full-season crops. Using no-till farming methods or a system of conservation tillage that leaves crop residue on the surface conserves moisture and increases the rate of water infiltration. Banded or split applications of fertilizer minimize the loss of nutrients, especially nitrogen, and help to prevent the pollution of ground water. Limiting fieldwork when the surface layer and subsoil are too wet helps to minimize compaction.

This soil is well suited to hay and pasture. It is suited to a wide variety of forage plants. Deep-rooted species that can tolerate droughtiness are the best suited. The soil warms up early in the spring and produces good spring pasture, but droughtiness later in the growing season reduces production. More moisture is available for seed germination in the spring than in the summer.

This soil is well suited to woodland plants, including woody ornamentals. No major limitations affect planting, management, or harvesting.

This soil is well suited to use as a site for buildings or for septic tank absorption fields. There are no natural pond sites, and excavated ponds are very unlikely to hold water.

The land capability classification is I. The pasture and hayland suitability group is A-1. The woodland ordination symbol is 4A.

CcB—Chavies loam, 2 to 6 percent slopes. This deep, gently sloping, well drained soil is on outwash terraces. Most areas are round or oblong and range from 10 to 200 acres in size.

Typically, the surface layer is brown, friable loam about 9 inches thick. The subsoil is about 39 inches thick. The upper part is yellowish brown, friable loam and sandy loam, and the lower part is yellowish brown, very friable gravelly loam and gravelly sandy loam. The underlying material to a depth of 80 inches or more is dark yellowish brown, loose gravelly loamy sand. In places the surface layer is sandy loam or silt loam. Some areas are more gravelly and have a subsoil that contains more clay.

Included with this soil in mapping are small areas of Watertown, Cidermill, and Chagrin soils. Watertown soils are in the strongly sloping areas. They are more sandy than the Chavies soil. Cidermill soils are silt loam in the surface layer and the upper part of the subsoil. Chagrin soils are in the lower areas that are rarely flooded. Also included are areas in the flood pool of the Wills Creek dam that are subject to controlled flooding. Included areas make up about 20 percent of most delineations.

Permeability is moderately rapid in the Chavies soil. Runoff is slow. Available water capacity is moderate. The content of organic matter is moderate in the surface layer, and tilth is good. The root zone is deep. The capacity to store and release plant nutrients is low.

Most areas are used for crops. Some areas are used as pasture or for suburban housing.

This soil is well suited to cultivated crops, including specialty crops. The soil dries early in the spring and is well suited to irrigation. Conserving soil moisture is the main management concern. The soil is better suited to crops that mature early in the growing season than to full-season crops. Erosion is a hazard in cultivated areas. Using no-till farming methods or a system of conservation tillage that leaves crop residue on the surface conserves moisture, helps to control erosion, and increases the rate of water infiltration. Banded or split applications of fertilizer minimize the loss of nutrients, especially nitrogen, and help to prevent the pollution of ground water. Limiting fieldwork when the surface layer and subsoil are too wet helps to minimize compaction.

This soil is well suited to hay and pasture (fig. 5). It is suited to a wide variety of forage plants. Deep-rooted species that can tolerate droughtiness are the best suited. The early warming of the soil results in good spring pasture, but droughtiness limits production later in the growing season. More moisture is available for seed germination in the spring than later in the growing season.

This soil is well suited to woodland. No limitations interfere with planting, management, or harvesting.

This soil is well suited to use as a site for buildings or for septic tank absorption fields. There are few natural pond sites, and excavated ponds are very unlikely to hold water.

The land capability classification is IIe. The pasture and hayland suitability group is A-1. The woodland ordination symbol is 4A.

CeA—Chili loam, 0 to 3 percent slopes. This deep, nearly level, well drained soil is on glacial outwash terraces. Most areas are round or oblong and range from 10 to 100 acres in size.

Typically, the surface layer is dark grayish brown, friable loam about 12 inches thick. The subsoil is about 36 inches thick. The upper part is dark yellowish brown,

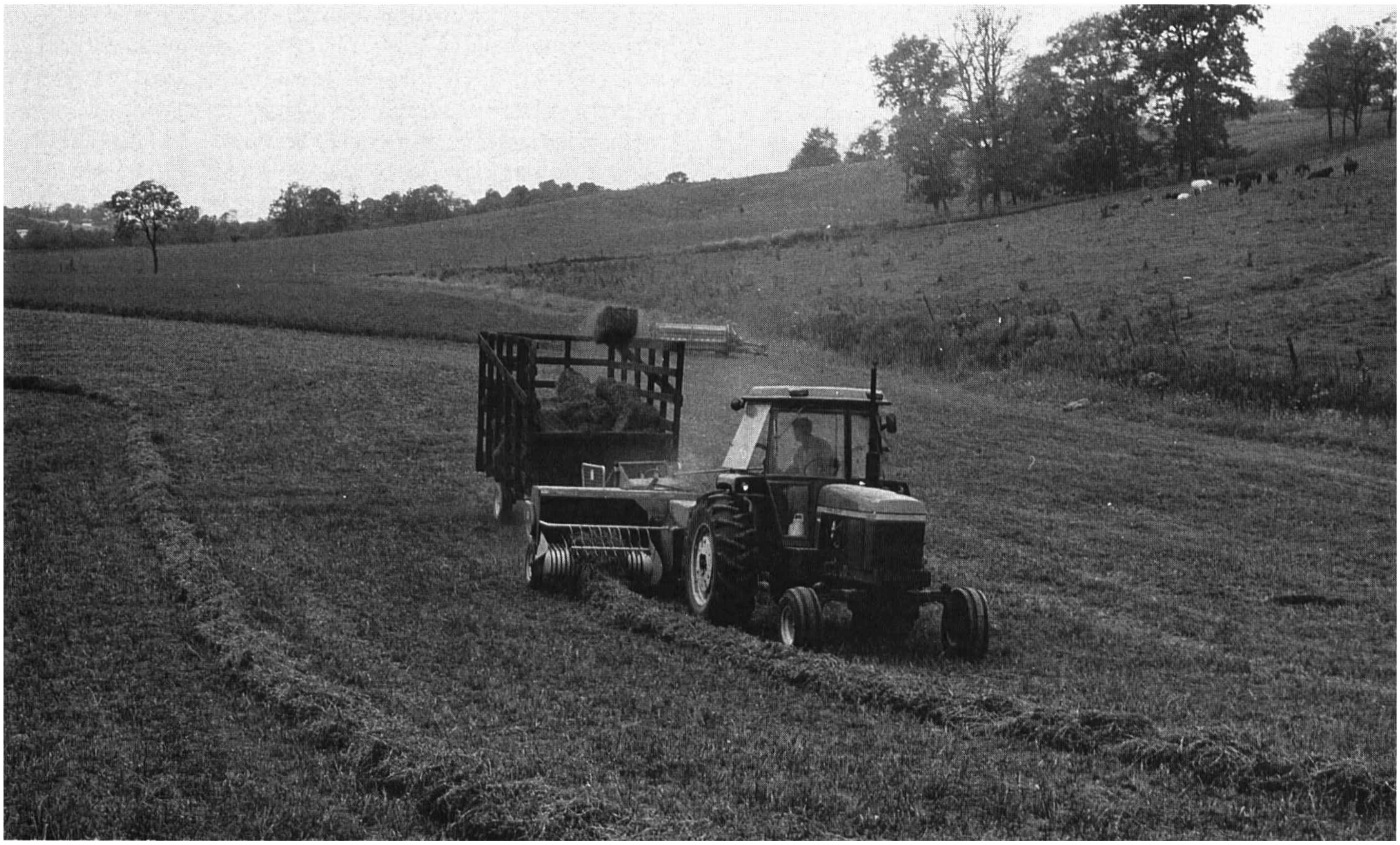

Figure 5.—Hay being harvested in an area of Chavies loam, 2 to 6 percent slopes. An area of Markland-Glenford complex, 15 to 35 percent slopes, eroded, is in the background.

friable loam, and the lower part is brown, friable gravelly coarse sandy loam. The underlying material to a depth of 70 inches or more is grayish brown, loose gravelly loamy sand and gravelly sand. In some areas the surface layer is silt loam or sandy loam.

Included with this soil in mapping are areas of the moderately well drained Rawson soils and areas of Cidermill and Watertown soils. Cidermill soils are less sandy than the Chili soil, and Watertown soils are more sandy. Also included are areas in the flood pool of the Dillon Lake dam that are subject to controlled flooding. Included areas make up about 15 percent of most delineations.

Permeability is moderately rapid in the Chili soil. Runoff is slow. Available water capacity is moderate. The content of organic matter is moderate in the surface layer. The root zone is deep, but roots do not penetrate the more gravelly layers during dry periods. The capacity to store and release plant nutrients is moderate.

Most areas are used for cultivated crops, especially corn. Some areas are used for soybeans, small grain, or hay. A few areas are wooded.

This soil is well suited to cultivated crops, including specialty crops. It dries early in the spring and is well suited to irrigation. Conserving moisture is the main management concern. Using no-till farming methods or a system of conservation tillage that leaves crop residue on the surface conserves moisture and increases the rate of water infiltration. Banded applications of fertilizer minimize the loss of nutrients, especially nitrogen, and help to prevent the pollution of ground water. Limiting fieldwork when the surface layer and subsoil are too wet helps to minimize compaction.

This soil is well suited to hay and pasture. It is well suited to many forage species. Deep-rooted species that can tolerate droughtiness are the best suited. The soil warms up early and produces good spring pasture, but droughtiness limits production later in the growing season.

This soil is well suited to timber production, but only a small acreage is used as woodland. No major limitations affect the planting, growth, or harvesting of trees.

This soil is well suited to use as a site for buildings or for septic tank absorption fields. Safety precautions are needed to prevent the caving of cutbanks in excavations. There are few natural pond sites, and excavated ponds are unlikely to hold water.

The land capability classification is IIs. The pasture and hayland suitability group is A-1. The woodland ordination symbol is 4A.

CeB—Chili loam, 3 to 8 percent slopes. This deep, gently sloping, well drained soil is on glacial outwash terraces. Most areas are round or oblong and range from 10 to 100 acres in size.

Typically, the surface layer is dark brown, friable loam about 9 inches thick. The subsoil is about 45 inches thick. The upper part is brown, friable loam, and the lower part is brown and dark yellowish brown, friable gravelly clay loam. The underlying material to a depth of 60 inches or more is yellowish brown, very friable gravelly loamy sand. In some areas the surface layer is silt loam or sandy loam.

Included with this soil in mapping are areas of the moderately well drained Rawson soils and areas of Cidermill and Watertown soils. Cidermill soils are less sandy than the Chili soil, and Watertown soils are more sandy. Also included are areas in the flood pool of the Dillon Lake dam that are subject to controlled flooding. Included areas make up about 15 percent of most delineations.

Permeability is moderately rapid in the Chili soil. Runoff is slow. Available water capacity is moderate. The content of organic matter is moderate in the surface layer. The capacity to retain and release plant nutrients is moderate. The root zone is deep, but roots do not penetrate the more gravelly layers during dry periods.

Most areas are used for corn. Some areas are used for soybeans, small grain, or hay. A few areas are wooded.

This soil is well suited to cultivated crops, including specialty crops. The soil dries early in the spring and is well suited to irrigation. Controlling erosion and conserving soil moisture are the main management concerns. The soil is better suited to crops that mature early in the growing season than to late-season crops. Using no-till farming methods or a system of conservation tillage that leaves crop residue on the surface helps to control erosion, conserves moisture, and increases the rate of water infiltration. Banded or split applications of fertilizer minimize the loss of nutrients, especially nitrogen, and help to prevent the pollution of ground water. Limiting fieldwork when the surface layer and subsoil are too wet helps to minimize compaction.

This soil is well suited to hay and pasture. It is suited to many forage species, but deep-rooted species that can withstand droughtiness are the best suited. The soil warms up early and produces good spring pasture, but droughtiness limits production later in the growing season.

This soil is well suited to timber production, but only a small acreage is used as woodland. No major limitations affect the planting, growth, or harvesting of trees.

This soil is well suited to building site development and to septic tank absorption fields. Safety precautions are needed to prevent the caving of cutbanks in excavations. There are few natural pond sites, and excavated ponds are unlikely to hold water.

The land capability classification is IIe. The pasture and hayland suitability group is A-1. The woodland ordination symbol is 4A.

ChA—Chili gravelly loam, 0 to 3 percent slopes. This deep, nearly level, well drained soil is on glacial outwash terraces. Most areas are round or oblong and range from 5 to 80 acres in size.

Typically, the surface layer is dark brown, friable gravelly loam about 9 inches thick. The subsoil is about 34 inches thick. It is dark yellowish brown, very friable gravelly loam and friable gravelly clay loam and brown, friable gravelly sandy loam. The underlying material to a depth of 60 inches or more is dark grayish brown, loose very gravelly sand. In some places, the surface layer is sandy loam and the soil has less gravel throughout. In a few areas the surface soil is silt loam or loam and retains more moisture. Some areas at the base of sloping hillsides have a seasonal high water table at a depth of 3 to 6 feet.

Included with this soil in mapping are small areas of Cidermill soils. These soils have a subsoil that is more silty than that of the Chili soil. Also included are areas of soils on low ridges that are more droughty than the Chili soil and that have a more gravelly subsoil and areas in the flood pool of the Dillon Lake dam that are subject to controlled flooding. Included areas make up about 15 percent of most delineations.

Permeability is moderately rapid in the Chili soil. Runoff is slow. Available water capacity is moderate. The content of organic matter is moderately low in the plow layer. The rate of water infiltration is good. The root zone is deep, but roots do not penetrate the more gravelly layers during dry periods. The capacity to store and release plant nutrients is low.

This soil is suited to a wide variety of uses because it is well drained and nearly level. Most areas are used for crops, but some areas are used as building sites. A few areas are wooded.

This soil is well suited to cultivated crops, including specialty crops. It dries early in the spring and is well suited to irrigation. Conserving soil moisture is the main management concern. Using no-till farming methods or a system of conservation tillage that leaves crop residue on the surface conserves moisture and increases the rate of water infiltration. Banded or split applications of fertilizer minimize the loss of nutrients, especially nitrogen, and help to prevent the pollution of ground water. Limiting fieldwork when the surface layer and subsoil are too wet helps to minimize compaction.

This soil is well suited to hay and pasture. It is well suited to many forage species. The soil warms up early and produces good spring pasture, but droughtiness limits production later in the growing season. Rotating the pasture with cultivated crops helps to establish the plants and control weeds.

This soil is well suited to timber production, but only a small acreage is used as woodland. No major limitations affect the planting, growth, or harvesting of trees. Species that can tolerate drought should be selected for planting.

This soil is well suited to building site development and septic tank absorption fields. Safety precautions are needed to prevent the caving of cutbanks in excavated areas. There are few natural pond sites, and excavated ponds are very unlikely to hold water.

The land capability classification is IIs. The pasture and hayland suitability group is A-1. The woodland ordination symbol is 4A.

ChB—Chili gravelly loam, 3 to 8 percent slopes. This deep, gently sloping, well drained soil is on slight rises on glacial outwash terraces. Most areas are round, oblong, or long and narrow and range from 5 to 50 acres in size.

Typically, the surface layer is dark brown, friable gravelly loam about 9 inches thick. The subsoil is about 34 inches thick. It is dark yellowish brown, friable gravelly loam, gravelly clay loam, and gravelly sandy loam. The underlying material to a depth of about 60 inches is brown and dark grayish brown, loose very gravelly loamy sand and gravelly sand.

Included with this soil in mapping are areas of very gravelly soils on low ridges that are more droughty than the Chili soil. Also included are areas in the flood pool of the Dillon Lake dam that are subject to controlled flooding. Included areas make up about 15 percent of most delineations.

Permeability is moderately rapid in the Chili soil. Runoff is medium. Available water capacity is moderate. The content of organic matter is moderately low in the surface layer. The root zone is deep, but roots do not penetrate the more gravelly layers during dry periods. The capacity to store and release plant nutrients is low.

Most areas are used as cropland. A few areas are used as pasture or woodland.

This soil is well suited to cultivated crops, including specialty crops. The hazard of erosion is moderate. Conserving soil moisture is a management concern. The soil dries early in the spring and is well suited to irrigation. It is better suited to crops that mature early in the growing season than to crops that mature late in summer. Using no-till farming methods or a system of conservation tillage that leaves crop residue on the surface conserves moisture, increases the rate of water infiltration, and reduces the hazard of erosion. Banded or split applications of fertilizer minimize the loss of nutrients, especially nitrogen, and help to prevent the pollution of ground water. Limiting fieldwork when the surface layer and subsoil are too wet helps to minimize compaction.

This soil is well suited to hay and pasture. It is suited to many forage species, but deep-rooted species that can tolerate droughtiness are the best suited. The soil warms up early and produces good spring pasture, but droughtiness limits production later in the growing season. Rotating pastures with cultivated crops helps to control weeds and establish the forage plants.

This soil is well suited to timber production, but only a small acreage is used as woodland. No major limitations affect the planting, growth, or harvesting of trees. Drought-tolerant species should be selected for planting.

This soil is well suited to building site development and septic tank absorption fields. Removing as little vegetation as possible, mulching, and establishing a temporary plant cover help to control erosion on construction sites. Safety precautions are needed to prevent the caving of cutbanks in excavated areas. There are few natural pond sites, and excavated ponds are unlikely to hold water.

The land capability classification is IIe. The pasture and hayland suitability group is A-1. The woodland ordination symbol is 4A.

ChC—Chili gravelly loam, 8 to 15 percent slopes. This deep, strongly sloping, well drained soil is on knolls and the dissected margins of glacial outwash terraces. Most areas are oblong and range from 5 to 20 acres in size.

Typically, the surface layer is dark brown, friable gravelly loam about 6 inches thick. The subsoil is about 31 inches thick. It is dark yellowish brown, friable gravelly loam, gravelly clay loam, and gravelly sandy loam. The underlying material to a depth of 60 inches or more is brown and dark grayish brown, loose very gravelly loamy sand and gravelly sand.

Included with this soil in mapping are small areas of soils on the upper part of slopes. These soils have a subsoil that is more gravelly than that of the Chili soil. Also included are areas in the flood pool of the Dillon Lake dam that are subject to controlled flooding. Included areas make up about 15 percent of most delineations.

Permeability is moderately rapid in the Chili soil. Runoff is medium or rapid. Available water capacity is low or moderate. The content of organic matter is moderately low in the surface layer. The root zone is deep, but roots do not penetrate the more gravelly layers during dry periods. The capacity to store and release plant nutrients is low.

Most areas are used as cropland. Some areas are used as pasture.

This soil is moderately suited to cultivated crops. If the soil is cultivated, the hazard of erosion is severe. The soil warms up and dries early in the spring but is droughty in summer. Crops that mature early in the growing season are better suited than full-season crops. Controlling erosion and conserving moisture are the major management concerns. Using no-till farming methods or a system of conservation tillage that leaves crop residue on the surface helps to control erosion and conserves moisture. The soil is well suited to no-till farming methods. Including grasses and legumes in the cropping system, planting cover crops, tilling on the contour, stripcropping, and establishing grassed waterways reduce the hazard of erosion. Banded or split applications of fertilizer minimize the loss of nutrients, especially nitrogen, and help to prevent the pollution of ground water.

This soil is well suited to hay and pasture. It is suited to many forage species, but deep-rooted species that can tolerate droughtiness are the best suited. The soil warms up early and produces good spring pasture, but droughtiness limits production later in the growing season. If the soil is plowed, the hazard of erosion is moderate. Using no-till seeding methods reduces this hazard.

This soil is well suited to timber production, but only a small acreage is used as woodland. No major limitations affect the planting, growth, or harvesting of trees. Species that can tolerate drought should be selected for planting.

This soil is moderately suited to use as a site for buildings or for septic tank absorption fields. The slope is a management concern. Removing as little vegetation as possible, mulching, and establishing a temporary plant cover in exposed areas reduce the hazard of erosion on construction sites. Designing buildings so that they conform to the natural slope of the land reduces the need for excavation and grading. Installing leach lines on the contour helps to prevent the surfacing of effluent. Safety precautions are needed to prevent the caving of cutbanks in excavated areas. Excavated ponds are unlikely to hold water.

This soil is recognized as farmland of local importance. The land capability classification is IIIe. The pasture and hayland suitability group is A-1. The woodland ordination symbol is 4A.

CkA—Cidermill silt loam, 0 to 3 percent slopes. This deep, nearly level, well drained soil is on broad terraces and glacial outwash plains that have a mantle of windblown silt. Most areas are irregular in shape and range from 10 to 300 acres in size.

Typically, the surface layer is dark grayish brown, friable silt loam about 8 inches thick. The subsoil is about 48 inches thick. The upper part is yellowish brown, friable silt loam, and the lower part is yellowish brown, friable loam and very friable fine sandy loam. The underlying material to a depth of 80 inches or more is yellowish brown, loose loamy fine sand and loose, stratified sand and gravelly sand. In some areas the silty material is more than 4 feet thick. In other areas the subsoil has more sand and less silt. A few areas are gently sloping. In places the underlying material is more gravelly.

Included with this soil in mapping are small areas of Glenford, Fitchville, Watertown, and Chavies soils. The moderately well drained Glenford and somewhat poorly drained Fitchville soils are in slight depressions and drainageways. Watertown and Chavies soils are on small knolls and ridges. Also included are a few areas of urban land and areas in the flood pools of the Dillon Lake dam and the Wills Creek dam that are subject to controlled flooding. Included areas make up less than 20 percent of most delineations.

Permeability is moderate in the subsoil of the Cidermill soil and rapid in the underlying material. Runoff is slow. Available water capacity is high or moderate. The content of organic matter is moderately low in the surface layer. The soil crusts after periods of heavy rainfall, especially in tilled areas. The root zone is deep. The capacity to store and release plant nutrients is moderate.

Most areas are used for corn, soybeans, small grain, or hay. A small acreage is used for specialty crops, such as strawberries and potatoes.

This soil is well suited to cultivated crops, including specialty crops. The soil dries early in the spring and is well suited to irrigation. It is better suited to crops that mature early in the growing season than to full-season crops. If the soil is cultivated, surface crusting after rains reduces the rate of water infiltration and hinders the emergence of seedlings. Shallow cultivation of intertilled crops, however, breaks up the crust. Using no-till farming methods or a system of conservation tillage that leaves crop residue on the surface conserves moisture and increases the rate of water infiltration. Banded applications of fertilizer minimize the loss of nutrients, especially nitrogen, and help to prevent the pollution of ground water. Limiting fieldwork when the surface layer and subsoil are too wet helps to minimize compaction.

This soil is well suited to pasture. A wide variety of adapted forage plants can be used. The soil warms up early and produces good spring pasture.

This soil is well suited to timber production, but only a small acreage is used as woodland. Plant competition can be controlled by removing vines and the less desirable trees and shrubs.

This soil is well suited to use as a site for buildings or for septic tank absorption fields. Safety precautions are needed to prevent the caving of cutbanks in excavations. Suitable base material is needed to minimize the damage to roads and streets caused by low strength and by frost action.

The land capability classification is I. The pasture and hayland suitability group is A-1. The woodland ordination symbol is 5A.

CnB—Cincinnati silt loam, 2 to 6 percent slopes. This deep, gently sloping, well drained soil is on broad ridgetops or on the mildly dissected parts of glaciated hillsides that have been covered by windblown silt. Most areas are oblong or are irregular in shape and range from 10 to 80 acres in size.

Typically, the surface layer is dark grayish brown, very friable and friable silt loam about 8 inches thick. The subsoil is about 61 inches thick. The upper part is brown and yellowish brown, friable silt loam; the next part is a fragipan of yellowish brown, dense, very firm silty clay loam and clay loam; and the lower part is yellowish brown, firm silty clay loam. The underlying material is dark yellowish brown and olive brown, soft, interbedded shale and siltstone. Some areas do not have a dense fragipan. In places the subsoil has more sand and pebbles. Many areas on concave slopes are moderately well drained.

Included with this soil in mapping are small areas of the moderately deep Gilpin soils on the crests of hills. Also included are small areas of somewhat poorly drained soils along drainageways and seepage zones. Included soils make up about 15 percent of most delineations.

Permeability is moderate above the fragipan in the Cincinnati soil and moderately slow or slow in the fragipan. Runoff is medium. Roots are generally restricted by the fragipan. Available water capacity is moderate. The content of organic matter is moderately low in the surface layer. A seasonal high water table is perched in or above the fragipan during extended wet periods. The capacity to store and release plant nutrients is moderate. The potential for frost action is high. The shrink-swell potential is moderate in the lower part of the subsoil.

Most areas are used for cultivated crops or for hay. Some areas are used as pasture or grazed woodland.

This soil is well suited to cultivated crops, including specialty crops. The hazard of erosion is moderate in cultivated areas. If the soil is cultivated, surface crusting after rains reduces the rate of water infiltration and retards the emergence of seedlings. Using a system of conservation tillage, such as no-till farming, that leaves crop residue on the surface, including grasses and legumes in the cropping system, planting cover crops, and tilling on the contour reduce the hazard of erosion (fig. 6). Limiting fieldwork when the surface layer and subsoil are too wet helps to minimize compaction.

This soil is well suited to hay and pasture. The roots of some forage plants are restricted by the fragipan. Frost heave can damage deep-rooted legumes, especially in pure stands. Leaving a protective cover on the surface in the fall or seeding a mixture of grasses and legumes can minimize the damage caused by frost heave. If the soil is plowed, the hazard of erosion is moderate. Seeding companion crops, adding mulch, or using no-till seeding methods reduces the hazard of erosion.

This soil is well suited to timber production. No major limitations affect the planting or growth of trees. The soil has low strength when wet and cannot support heavy equipment. Spreading aggregate on haul roads or log landings helps to stabilize the surface. Controlling vines and removing undesirable trees help to increase the long-term production of sawlogs and provide firewood.

This soil is well suited to use as a site for buildings, but wetness is a management concern. Installing drains around footings and coating exterior walls help to prevent wet basements. The soil is only moderately suited to septic tank absorption fields because of the wetness and the restricted permeability in the fragipan. Enlarging the leaching area or installing a double leach field can help to overcome the restricted permeability. Perimeter drains can be used to lower the water table in areas used for septic tank absorption fields.

There are few natural pond sites. Excavated ponds may be able to hold water, provided the excavation does not extend into the weathered bedrock. Onsite investigation is needed.

The land capability classification is IIe. The pasture

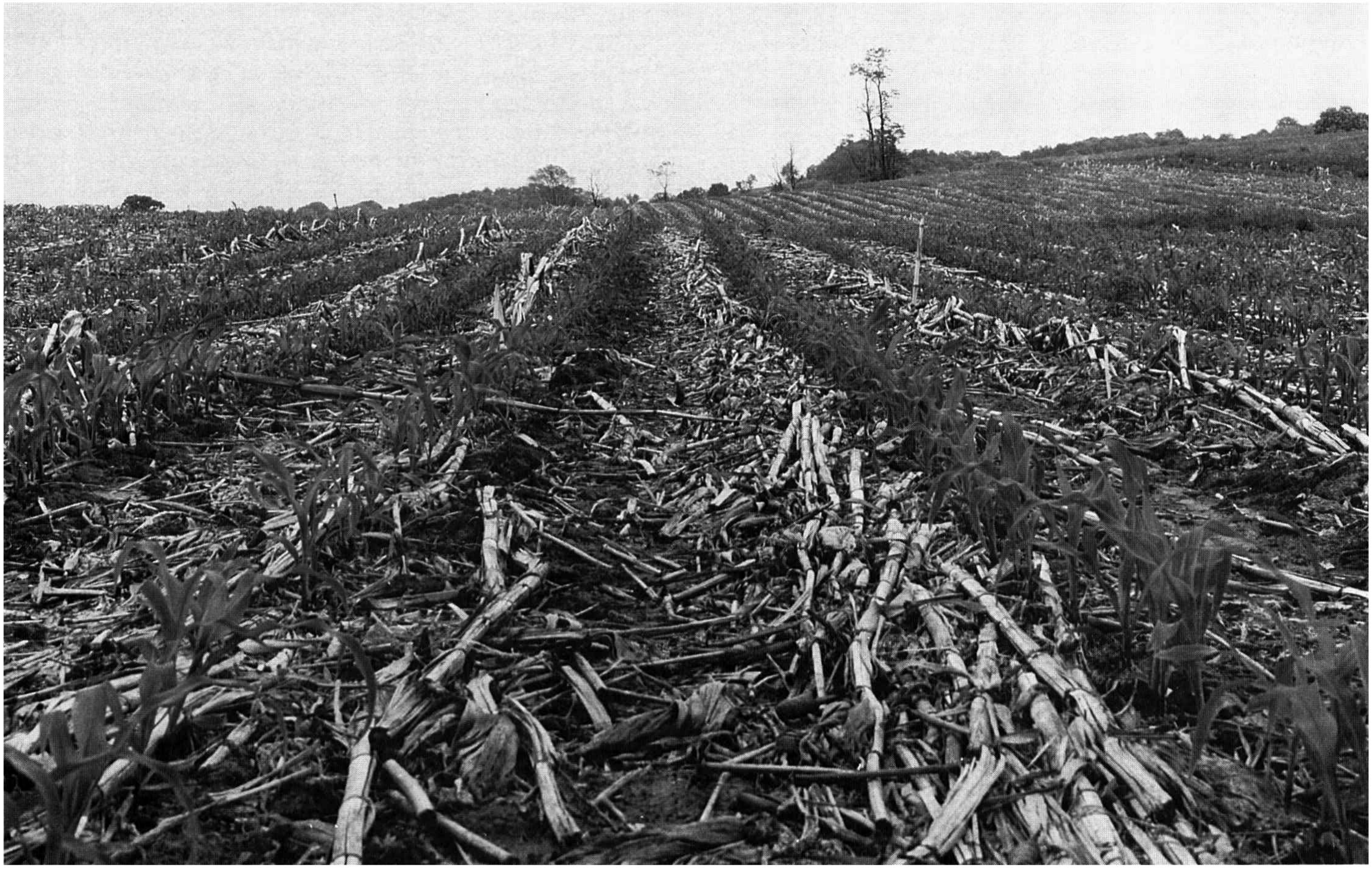

Figure 6.—No-till farming methods used for corn in an area of Cincinnati silt loam, 2 to 6 percent slopes.

and hayland suitability group is F-3. The woodland ordination symbol is 4A.

CnC2—Cincinnati silt loam, 6 to 15 percent slopes, eroded. This deep, strongly sloping, well drained soil is on shoulder slopes and the dissected parts of glaciated hillsides that have been covered by windblown silt. Erosion has removed part of the original surface layer and reduced the thickness of the subsoil layers above the fragipan. Most areas are oblong or are irregular in shape and range from 10 to 80 acres in size.

Typically, the surface layer is dark grayish brown and brown, friable silt loam about 8 inches thick. The subsoil is about 61 inches thick. The upper part is brown and yellowish brown, friable silt loam. The next part is a fragipan of yellowish brown, dense, very firm silty clay loam and clay loam. The lower part is yellowish brown, firm silty clay loam. The underlying material is dark yellowish brown, soft, interbedded shale and siltstone. In places the subsoil has more sand and pebbles. A few areas do not have a dense layer in the subsoil.

Included with this soil in mapping are a few areas of the moderately deep Gilpin soils and areas of somewhat poorly drained soils along drainageways and seepage zones. Also included are severely eroded areas of soils that are moderately well drained. Included areas make up about 20 percent of most delineations.

Permeability is moderate above the fragipan in the Cincinnati soil and moderately slow or slow in the fragipan. Runoff is rapid. The root zone is limited mainly to the layers above the fragipan. Available water capacity is moderate. Because the plow layer is a mixture of material from the surface layer and the subsoil, the content of organic matter is low. A seasonal high water table is in or above the fragipan during wet periods. The capacity to store and release plant nutrients is low or moderate. The potential for frost action is high.

Most areas are used as cropland or pasture. Some areas are wooded and have been grazed.

This soil is only moderately suited to cultivated crops. Many areas are significantly eroded, and controlling further erosion is the main management concern. The hazard of erosion is severe in cultivated areas. If the soil is cultivated, surface crusting after rains reduces the rate of water infiltration and retards the emergence of seedlings. Using a system of conservation tillage, such as no-till farming, that leaves crop residue on the surface, including grasses and legumes in the cropping system, planting cover crops, tilling on the contour, stripcropping, and establishing grassed waterways can reduce the hazard of erosion. Limiting fieldwork when the surface layer and subsoil are too wet helps to minimize compaction.

This soil is well suited to hay and pasture. The roots of some forage species are restricted by the fragipan. Frost heave can damage deep-rooted legumes, especially in pure stands. Leaving a protective cover on the surface in the fall or including grasses in the seeding mixture can minimize frost damage. If the soil is plowed, the hazard of erosion is moderate. Seeding companion crops, adding mulch, or using no-till seeding methods reduces the hazard of erosion.

This soil is well suited to timber production. No major limitations affect the planting or growth of trees. The soil has low strength when wet and cannot support heavy equipment. Spreading aggregate on haul roads or log landings helps to stabilize the surface. Controlling vines and removing undesirable trees increase the long-term production of sawlogs and provide firewood.

This soil is well suited to use as a site for buildings. The slope and the seasonal wetness are limitations. Maintaining a cover of plants during construction helps to control erosion. Installing drains around footings and coating exterior basement walls help to prevent wet basements. The soil is only moderately suited to septic tank absorption fields. The seasonal wetness and the restricted permeability in the fragipan are limitations. Enlarging the leaching area or using a double field helps to overcome the restricted permeability. Establishing lines across the slope can prevent the surfacing of effluent. Perimeter drains can be used to lower the seasonal high water table.

Ponds can be developed by damming some of the natural drainageways. The upper part of the soil packs poorly and is poor fill, but the fragipan and the lower part of the subsoil commonly are good fill. If ponds are excavated, care should be taken to prevent the exposure of rock layers. Onsite investigation is needed to determine the depth to bedrock.

This soil is recognized as farmland of local importance. The land capability classification is IIIe. The pasture and hayland suitability group is F-3. The woodland ordination symbol is 4A.

CpC2—Clarksburg silt loam, 8 to 15 percent slopes, eroded. This deep, strongly sloping, moderately well drained soil is on slightly concave foot slopes or benches below the steeper hillsides. Erosion has removed part of the original surface layer, and tillage has mixed the subsoil with the surface layer. Most areas are long and narrow and range from 5 to 20 acres in size.

Typically, the surface layer is brown and yellowish brown, friable silt loam about 9 inches thick. The upper part of the subsoil, to a depth of about 25 inches, is yellowish brown, friable silt loam, firm silty clay loam, and channery clay loam. The next part, to a depth of about 44 inches, is a fragipan of yellowish brown, mottled, very firm, brittle channery clay loam and clay loam. The lower part of the subsoil, to a depth of about 56 inches, is yellowish brown, mottled, firm silty clay loam. The underlying material to a depth of 80 inches or more is dark brown and yellowish brown, firm clay loam and channery clay loam. A few areas have moderately steep slopes. In some places, the subsoil has less sand and fewer coarse fragments and the underlying material is stratified. In other places the soil does not have a fragipan but has restrictive clayey layers in the lower part of the subsoil.

Included with this soil in mapping are small areas of the well drained Alford soils at the base of slopes. Also included are areas in the flood pools of the Dillon Lake dam and the Wills Creek dam that are subject to controlled flooding. Included areas make up about 15 percent of most delineations.

Permeability is moderate in the upper part of the subsoil in the Clarksburg soil and moderately slow or slow in the lower part of the subsoil and in the underlying material. Runoff from cultivated areas is rapid. The root zone is limited mainly to the layers above the dense fragipan. Available water capacity is low in the root zone. The content of organic matter is moderate in the surface layer. The capacity to retain and release plant nutrients is moderate. A seasonal high water table is perched above the fragipan in winter and spring and during other extended wet periods. The potential for frost action is moderate. Hillside seepage is common in areas of this soil, especially on the lower parts of slopes.

Most areas are used as pasture or woodland. A few areas are used as cropland.

This soil is only moderately suited to cultivated crops. Many areas are significantly eroded, and controlling further erosion is the main management concern. The hazard of erosion is severe in cultivated areas. Improving soil fertility and conserving moisture also are management concerns. If the soil is cultivated, surface crusting after rains reduces the rate of water infiltration and retards the emergence of seedlings. Using a system of conservation tillage, such as no-till farming, that leaves crop residue on the surface, including grasses and legumes in the cropping system, planting cover crops, tilling on the contour, stripcropping, and establishing grassed waterways can reduce the hazard of erosion. Limiting fieldwork when the surface layer and subsoil are too wet helps to minimize compaction. Subsurface drains are needed in seepy areas.

This soil is well suited to hay and pasture. The roots of some forage plants are restricted by the fragipan. Frost heave can damage deep-rooted legumes, especially in pure stands. Leaving a protective cover on the surface in the fall and seeding a mixture of grasses and legumes can minimize the damage caused by frost heave. If the soil is plowed, the hazard of erosion is moderate. Seeding companion crops, adding mulch, or using no-till seeding methods reduces the hazard of erosion.

This soil is well suited to timber production. No major limitations affect the planting or growth of trees. The soil has low strength when wet and cannot support heavy equipment. Spreading aggregate on haul roads or log landings helps to stabilize the surface.

This soil is only moderately suited to use as a site for buildings or for septic tank absorption fields because of the slope, the shrink-swell potential, the wetness, and the restricted permeability. Increased runoff and erosion are management concerns on construction sites. Replacing or maintaining the vegetative cover can minimize runoff and reduce the hazard of erosion. Drains around footings can lower the water table. Backfilling with gravel around foundations helps to intercept water seeping along the top of the fragipan and helps to prevent the damage caused by shrinking and swelling. Enlarging the leaching area for absorption fields helps to overcome the restricted permeability in the fragipan. Perimeter drains can be used to lower the water table. Installing leaching lines on the contour helps to prevent the surfacing of effluent. Water seeping or flowing out of adjacent hillsides should be diverted away from building sites and septic tank absorption fields.

This soil has good potential for ponds. Springs at the base of hills are a good water source. The soil material packs well and generally makes good fill. Onsite investigation is needed to determine the depth to bedrock.

This soil is recognized as farmland of local importance. The land capability classification is IIIe. The pasture and hayland suitability group is F-3. The woodland ordination symbol is 4A.

CrC—Claysville-Guernsey silty clay loams, 8 to 15 percent slopes. These deep, strongly sloping soils are on foot slopes and benches in areas where ground water seeps to the surface at the headwaters of small drainageways. The microrelief is hummocky because of common landslides and gullies. The somewhat poorly drained Claysville soil is on concave slopes, and the moderately well drained Guernsey soil is on convex slopes. The two soils occur as areas so closely intermingled that it is impractical to map them separately. Most areas are about 50 percent Claysville soil and 30 percent Guernsey soil. Individual areas are funnel shaped and range from 2 to 10 acres in size.

Typically, the surface layer of the Claysville soil is very dark grayish brown, friable silty clay loam about 13 inches thick. The subsoil is about 41 inches thick. It is dark grayish brown, light olive brown, and light brownish gray, mottled, firm silty clay loam, silty clay, and shaly silty clay. The underlying material to a depth of 84 inches or more is light brownish gray and yellowish brown, mottled, firm silty clay loam and shaly silty clay loam. In eroded areas the dark surface layer is less than 10 inches thick.

Typically, the surface layer of the Guernsey soil is brown, friable silty clay loam about 7 inches thick. The subsoil is about 32 inches thick. The upper part is light olive brown and brown, mottled silty clay and clay. The lower part is weak red and olive gray clay. The underlying material to a depth of 60 inches or more is light olive brown and light olive gray silty clay. In severely eroded areas the surface layer is silty clay and consists mostly of subsoil material. Some areas are well drained.

Included with these soils in mapping are areas of Upshur soils. Upshur soils are in convex areas and are better drained than the Claysville and Guernsey soils. Also included, in the wetter areas that have a high water table near the surface most of the year, are soils that have a surface layer of black silty clay that is as much as 30 inches thick. In some areas where landslides have occurred, the soils have no continuous horizons but are dominated by clayey subsoil material. A few areas on alluvial fans along flood plains are better drained than the Claysville and Guernsey soils. Included areas make up about 20 percent of most delineations.

Permeability is slow in the Claysville soil and moderately slow or slow in the Guernsey soil. Runoff is medium or rapid on both soils, but seepage commonly keeps the surface wet for long periods. The rate of water infiltration is commonly reduced by a compacted surface layer. Available water capacity is moderate. The content of organic matter is high in the surface layer of

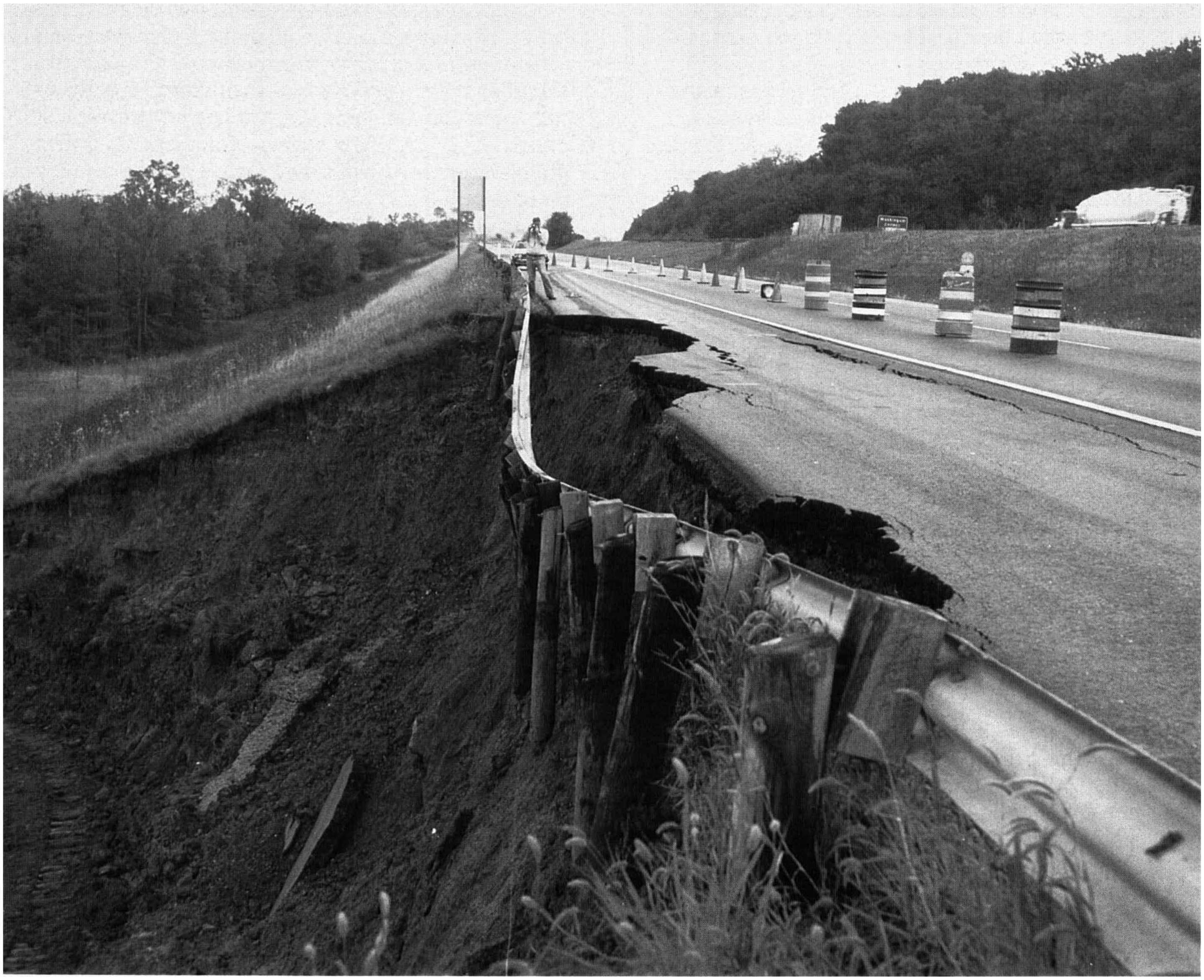

Figure 7.—Landslide damage in an area of Claysville-Guernsey silty clay loams, 8 to 15 percent slopes.

the Claysville soil and moderately low in the surface layer of the Guernsey soil. The rooting depth in the Claysville soil varies, depending on the depth to the seasonal high water table. It is deep in the Guernsey soil. A seasonal high water table is perched in the upper part of the subsoil in the Claysville soil and in the lower part of the Guernsey soil during extended wet periods. Both soils have a high capacity to store and release plant nutrients. They are generally unstable when wet and are subject to landslides or slippage (fig. 7).

Most areas are used as pasture. A few areas are cultivated. Some areas that were used for mining or as oil fields support native plant cover consisting of species that can survive in wet or swampy conditions. A few areas are wooded. Native trees that can tolerate wetness include elm, ash, pin oak, and red maple.

These soils are only moderately suited to cultivated crops. Wetness and the hazard of erosion are management concerns. Deep-rooted plants do not grow well in undrained areas of the Claysville soil. The Claysville soil is suited to crops if adequate subsurface drainage is provided. It is likely to be more stable if the water table is lowered. Subsurface drains should be closely spaced because of the slow permeability in the subsoil. Natural drainage generally is adequate in the Guernsey soil. Tilling on the contour, establishing grassed waterways, and leaving crop residue on the surface help to control runoff and erosion. In some areas the use of machinery is limited because of the hummocky terrain.

These soils are only moderately suited to hay and pasture. They are not well suited to deep-rooted legumes, such as alfalfa, even if they are drained. The Claysville soil is suited only to forage plants that can tolerate considerable wetness. The Guernsey soil is suited to a wider range of forage species. The high pH of the Claysville soil is favorable for bluegrass pasture. Grazing when the soils are soft and wet can damage the sod and results in excessive surface compaction. Springs for livestock water can be developed in many areas.

These soils are only moderately suited to woodland. Species that are tolerant of wetness grow best on the Claysville soil. The Guernsey soil is suited to a wider variety of species. Plant competition can be controlled by removing vines and the less desirable trees and shrubs.

These soils are generally unsuited to use as sites for buildings because of the seasonal wetness, the shrink-swell potential, and unstable slopes. The Claysville soil is generally unsuited to septic tank absorption fields because of the restricted permeability, land slips, and the wetness. The Guernsey soil is poorly suited because of the wetness and the restricted permeability. Most areas of the Guernsey soil are too small for a large septic tank absorption field. A perimeter drain helps to lower the seasonal high water table. An aerator or other alternative system should be considered.

Ponds can be developed below some of the springs. Fills are subject to cracking because of slippage. The soil material packs well only when it is at the proper moisture content.

The land capability classification is IIIw. The pasture and hayland suitability group is C-2 for the Claysville soil and A-6 for the Guernsey soil. No woodland ordination symbol is assigned for the Claysville soil. The woodland ordination symbol for the Guernsey soil is 4A.

CsC2—Coshocton silt loam, 8 to 15 percent slopes, eroded. This deep, strongly sloping, moderately well drained soil is in saddles on ridgetops. Slopes are mostly concave, and seeps or springs are common. Erosion has removed part of the original surface layer and reduced the depth to the more clayey subsoil. Most areas are oblong or are irregular in shape and range from 5 to 30 acres in size.

Typically, the surface layer and subsurface layer are dark grayish brown and brown, friable silt loam about 7 inches thick. The subsoil is about 39 inches thick. The upper part, to a depth of about 20 inches, is brown and yellowish brown, firm channery clay loam. The lower part, to a depth of about 46 inches, is brown, mottled, firm silty clay loam. The underlying material to a depth of 60 inches or more is brown and yellowish brown, firm silty clay loam and silty clay. In the less sloping areas, the soil contains fewer rock fragments. In some areas the subsoil has more clay. In a few areas the surface layer has more stones. Soils that have a fragipan are on some benches or foot slopes.

Included with this soil in mapping are the well drained Gilpin, Rigley, and Westmoreland soils. Gilpin soils are in areas that are moderately deep over soft siltstone bedrock. Rigley and Westmoreland soils are on the steeper convex slopes. Also included, near seep zones and drainageways, are soils that are wetter than the Coshocton soil. Included soils make up about 20 percent of most delineations.

Permeability is moderately slow or slow in the Coshocton soil. Runoff is rapid. Available water capacity is moderate. The content of organic matter is moderately low in the eroded surface layer. The root zone is deep. The capacity to store and release plant nutrients is moderate. A seasonal high water table is in the subsoil during extended wet periods. The potential for frost action is high. The shrink-swell potential is moderate in the subsoil.

This soil is used mainly as cropland or pasture. Some areas are wooded (fig. 8). The trees in wooded areas are mostly second-growth native hardwoods, such as aspen, yellow-poplar, maple, and dogwood. Plantations of white pine and red pine are common.

This soil is only moderately suited to cultivated crops. Many areas are significantly eroded, and controlling further erosion is the main management concern. The hazard of erosion is severe in cultivated areas. Improving soil fertility and conserving moisture also are management concerns. Surface crusting after rains reduces infiltration and retards seedling emergence if the soil is cultivated. Using a system of conservation tillage, such as no-till farming, that leaves crop residue on the surface, including grasses and legumes in the cropping system, planting cover crops, tilling on the contour, stripcropping, and establishing grassed waterways can reduce the hazard of erosion. Limiting fieldwork when the surface layer and subsoil are too wet helps to minimize compaction. Wetness around seeps and springs often delays spring planting. Crops can be planted earlier and crop production is improved if a subsurface drainage system is used.

This soil is well suited to hay and pasture. It is suited to a wide variety of forage plants. Acidity in the root

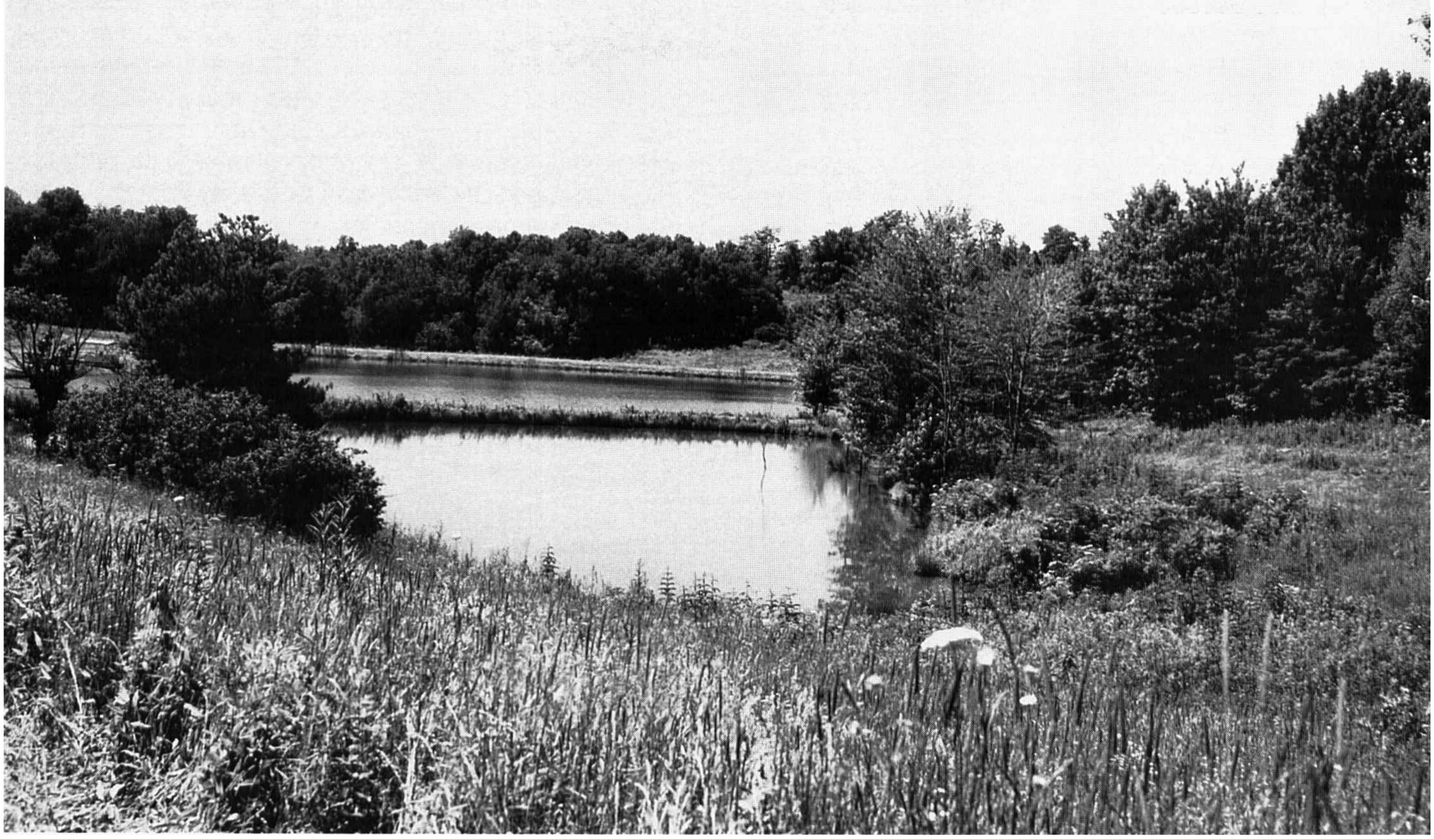

Figure 8.—Native trees, shrubs, and grasses in an area of Coshocton silt loam, 8 to 15 percent slopes, eroded. Wooded areas near ponds provide habitat for wildlife.

zone and wetness are limitations that affect some legumes. Frost heave can damage deep-rooted legumes, especially in pure stands. Leaving a protective cover on the surface in the fall or seeding a grass-legume mixture can minimize the damage caused by frost heave. If the soil is plowed, the hazard of erosion is moderate. Seeding companion crops, adding mulch, or using no-till seeding methods can reduce the hazard of erosion. Springs that can provide water for livestock are common.

This soil is well suited to timber production. No major limitations affect the planting or growth of trees. The soil has low strength when wet and cannot support heavy equipment. Spreading aggregate on haul roads or log landings helps to stabilize the surface. Improving timber stands by controlling vines and thinning undesirable trees greatly increases the long-term production of sawlogs and provides firewood.

This soil is only moderately suited to use as a site for buildings. The seasonal high water table, the slope, and the shrink-swell potential are management concerns. Extra footings and reinforced walls are needed because of low strength and the moderate shrink-swell potential. Using a drainage system around foundations and waterproofing walls can reduce seepage into basements. The hazard of erosion on construction sites can be reduced by removing as little vegetation as possible, by seeding a temporary cover, and by providing stable channels for the flow of storm water.

This soil is poorly suited to conventional septic tank absorption fields. The restricted permeability in the lower part of the subsoil and the seasonal high water table are limitations. Using perimeter drains around absorption fields can lower the seasonal high water table and intercept lateral seepage from the higher areas. Enlarging the absorption field increases the absorption of effluent. Installing distribution lines on the contour helps to prevent the surfacing of effluent. An aerator or an alternative system should be considered.

Good sites for ponds are in draws that cross areas of this soil. The soil material is good fill and commonly packs well, but layers that permit excessive seepage are in some areas. Onsite investigation is needed.

This soil is recognized as farmland of local importance. The land capability classification is IIIe. The pasture and hayland suitability group is A-6. The woodland ordination symbol is 4A.

CsD—Coshocton silt loam, 15 to 25 percent slopes. This deep, moderately steep, moderately well drained soil is on the lower parts of hillsides and in coves at the head of minor drainageways on dissected hillsides. Gullies and soil-creep scars are common. Most areas are crescent shaped or long and narrow and range from 5 to 35 acres in size.

Typically, the surface layer is very dark gray and dark grayish brown, friable silt loam about 8 inches thick. The subsoil is about 32 inches thick. The upper part, to a depth of about 20 inches, is yellowish brown, firm silt loam and clay loam. The lower part, to a depth of about 40 inches, is yellowish brown, mottled, firm silty clay loam. The underlying material is dark yellowish brown, mottled, very firm silty clay loam about 25 inches thick. Dark gray and very dark grayish brown, soft shale bedrock is at a depth of about 65 inches. In some of the less sloping areas, the upper part of the soil is very silty and does not contain pebbles. In places the subsoil has more clay. In some severely eroded areas, the surface layer has more rock fragments.

Included with this soil in mapping are areas of the well drained Gilpin, Berks, and Westmoreland soils and areas of Rigley and Clarksburg soils. Gilpin and Berks soils are moderately deep over soft siltstone bedrock. Westmoreland soils are mainly on convex slopes. Rigley soils are near areas that have sandstone. Clarksburg soils have a fragipan. They are on some of the lower slopes. Also included are areas in the flood pools of the Dillon Lake dam and the Wills Creek dam that are subject to controlled flooding and somewhat poorly drained soils near seeps and springs. Included areas make up about 25 percent of most delineations.

Permeability is moderately slow or slow in the Coshocton soil. Runoff is very rapid. Available water capacity is moderate. The content of organic matter is moderately low in the surface layer. The root zone is deep. The capacity to store and release plant nutrients is moderate. A seasonal high water table is in the lower part of the subsoil during extended wet periods. The shrink-swell potential is moderate in the subsoil. The potential for frost action is high.

This soil is used mainly as pasture or woodland. A few areas are used as cropland. The wooded areas support second-growth stands of native hardwoods, such as yellow-poplar, maple, aspen, dogwood, and oak. Plantations of white pine, red pine, and spruce are common.

This soil is poorly suited to cultivated crops. Erosion is the main management concern. The hazard of erosion is very severe in cultivated areas. Maintaining a permanent plant cover is the best means of controlling erosion. If the soil is cultivated, surface crusting after rains reduces the rate of water infiltration and retards the emergence of seedlings. Using a system of conservation tillage, such as no-till farming, that leaves crop residue on the surface, including grasses and legumes in the cropping system, planting cover crops, tilling on the contour, stripcropping, and establishing grassed waterways can reduce the hazard of erosion. Limiting fieldwork when the surface layer and subsoil are too wet helps to minimize compaction. Randomly spaced subsurface drains are needed in seep spots.

This soil is only moderately suited to hay and pasture. A wide variety of forage plants can be used. Frost heave can damage deep-rooted legumes, especially in pure stands. Leaving a protective cover on the surface in the fall or seeding a grass-legume mixture can minimize the damage caused by frost heave. If the soil is plowed, the hazard of erosion is severe. Seeding companion crops, adding mulch, or using no-till seeding methods can reduce the hazard of erosion. Restricting grazing during wet periods helps to prevent compaction of the surface layer and damage to plant roots. Springs that can provide water for livestock throughout the year are common.

This soil is only moderately suited to timber production. The aspect of the slope affects the planting and growth of trees. Coves and north- and east-facing slopes are the best woodland sites. They have cooler temperatures and more available water than other sites because they are less exposed to the sun and prevailing winds. The soil has low strength when wet and cannot support heavy equipment. Spreading aggregate on haul roads or log landings helps to stabilize the surface. The slope restricts the use of planting and logging equipment. Establishing roads and skid trails on the contour, establishing water bars, and maintaining a vegetative cover help to control erosion. Where roads and trails cross channels, adding stones helps to prevent gullying. Using seedlings that have been transplanted once or adding mulch reduces the seedling mortality rate on south-facing slopes. Plant competition can be controlled by removing vines and the less desirable trees and shrubs.

This soil is poorly suited to use as a site for buildings because of the slope and the seasonal wetness. Soil creep is common, especially when the soil is wet. Using extra footings and reinforcing walls help to prevent the damage to foundations caused by soil creep. Using perimeter drains around foundations and waterproofing walls help to prevent seepage in basements. The hazard of erosion during construction can be reduced by limiting the excavated area, by seeding temporary grasses on the construction site, and by providing sediment basins to collect runoff.

This soil is generally unsuited to conventional septic tank absorption fields because of the restricted permeability, the seasonal wetness, and the slope.

Ponds can be developed in many of the small draws in areas of this soil. The soil material commonly packs well and is good fill for dams, but layers of porous or shattered rock that permit excessive seepage are in some areas. Onsite investigation is needed.

The land capability classification is IVe. The pasture and hayland suitability group is A-2. The woodland ordination symbol is 4R on north aspects and 3R on south aspects.

CtE—Coshocton-Westmoreland silt loams, 25 to 40 percent slopes. These deep, steep soils are on bluffs or are in ravines or hollows on dissected hillsides. The moderately well drained Coshocton soil is in the concave, less sloping landscape positions. The well drained Westmoreland soil is on the middle and upper parts of convex shoulder slopes or on the nose slopes of hillsides. Areas of these soils occur as alternating bands, which are associated with different bedrock strata. They commonly are 150 to 500 feet wide and are 10 to 300 acres in size. Most areas are about 45 percent Coshocton soil and 35 percent Westmoreland soil. The two soils occur as areas so intricately mixed or so small that it is impractical to map them separately.

Typically, the surface layer of the Coshocton soil is dark grayish brown, friable silt loam about 8 inches thick. The subsoil is about 32 inches thick. The upper part is yellowish brown, friable silt loam, and the lower part is yellowish brown, mottled, firm silty clay loam. The underlying material is yellowish brown, firm silty clay about 20 inches thick. Soft, weathered siltstone and shale bedrock is at a depth of about 60 inches. In some areas the surface layer is channery loam or loam.

Typically, the surface layer of the Westmoreland soil is dark grayish brown, very friable silt loam about 5 inches thick. The subsoil is about 32 inches thick. The upper part is yellowish brown, friable silty clay loam, and the lower part is brown and yellowish brown, friable and firm shaly silty clay loam. The underlying material is brown, firm very shaly silty clay loam about 28 inches thick. Soft, weathered shale bedrock is at a depth of about 65 inches. In places the subsoil contains more sand and less clay. In some areas on convex slopes, the soil is moderately deep over bedrock.

Included with these soils in mapping are small areas of Berks, Clarksburg, Guernsey, Lobdell, Newark, Omulga, and Rigley soils. The moderately deep, channery Berks soils and the Rigley soils are in very steep areas on the upper part of hillsides. Rigley soils are more sandy than the major soils. Guernsey soils are on moderately steep benches. They are more clayey than the major soils. Also, they are susceptible to slippage. Omulga and Clarksburg soils are on foot slopes. They have a fragipan. Lobdell and Newark soils are on very narrow flood plains along small streams. They are subject to flooding. Also included are areas in the flood pools of the Dillon Lake dam and the Wills Creek dam that are subject to controlled flooding. Included areas make up about 25 percent of most delineations.

Permeability is moderately slow or slow in the Coshocton soil and moderate in the Westmoreland soil. Runoff is rapid on both soils. Available water capacity is moderate. The content of organic matter is moderately low in the surface layer. The root zone is deep. A seasonal high water table is perched in the subsoil of the Coshocton soil in late winter and in spring and during other extended wet periods. The potential for frost action is moderate in the Westmoreland soil and high in the Coshocton soil. The shrink-swell potential is moderate in the subsoil of the Coshocton soil.

Most areas are wooded. A few areas are used as pasture.

These soils are generally unsuited to cultivated crops and to hay because of the slope and a very severe hazard of erosion. Maintaining a permanent plant cover is the best means of controlling erosion.

These soils are poorly suited to pasture. The slope limits the use of farm equipment. A wide variety of forage plants can grow on these soils, but seeding and management are difficult. Frost heave in areas of the Coshocton soil can damage deep-rooted legumes, especially in pure stands. Leaving a protective cover on the surface in the fall or including grasses in the seeding mixture can minimize the damage caused by frost heave. If the soils are tilled, the hazard of erosion is very severe. Seeding companion crops, adding mulch, or using no-till seeding methods can reduce the hazard of erosion. Established pastures should be maintained for as long as possible. In overgrazed areas the hazard of erosion can be very severe.

These soils are only moderately suited to timber production. The slope limits the use of many types of equipment. The hazard of erosion during harvesting can be reduced by building logging roads and skid trails on the contour and by establishing water bars. Plant competition can be controlled by removing vines and the less desirable trees and shrubs. Mechanical tree planters and mowers used for weed control cannot be operated safely on these soils. Planting seedlings that have been transplanted once or mulching reduces the seedling mortality rate, especially on south aspects. Coves and north- and east-facing slopes are the best woodland sites. They have cooler temperatures and more available water than other sites because they are less exposed to the sun and prevailing winds.

These soils are generally unsuited to use as sites for buildings because of the slope. Building roads and driveways on the contour and seeding road cuts can reduce the hazard of erosion.

These soils are generally unsuited to septic tank absorption fields because of the slope. The seasonal wetness and the restricted permeability in the Coshocton soil also are limitations.

Areas of these soils in the upper reaches of drainageways have some potential as sites for ponds. The drainageways have a considerable grade, and a high fill is needed to create an impoundment of any size. The soil material is generally a good source of fill. Rock layers that permit excessive seepage are in some areas. Onsite investigation is needed.

The land capability classification is VIe. The pasture and hayland suitability group is A-3. The woodland ordination symbol for the Coshocton soil is 4R on north aspects and 3R on south aspects. The woodland ordination symbol for the Westmoreland soil is 4R.

Ds—Dumps and Pits, mine. This map unit consists of mine dumps and mine pits that remain in areas that were used for surface and underground coal mining.

Mine dumps are gently sloping to very steep ridges or cone-shaped piles of waste material from coal mining. They are in unreclaimed strip-mine pits, at the opening of drift mines, and around coal loading areas (fig. 9). The waste material is mostly soft, impure coal and black, carbonaceous roof shale that originally had a relatively high content of sulfur compounds. It is referred to locally as "mine gob," "gob," or "gob piles." Some areas have burned or oxidized over time and consist of hard, red to gray, shaly or gravelly material. This material is referred to locally as "red dog." A few areas have been graded.

Mine pits are nearly level to sloping areas of exposed underclay that remain in areas that were strip-mined for coal. They are most common in unreclaimed mine areas. The surface in these areas is barren and has many rills and gullies. Residue of coal and red dog is commonly on the surface. Most areas are sinuous and follow the approximate path of the last mining activities.

Included in mapping are many shallow ponds in which surface water collects. The water in many of these ponds is too acid for fish and wildlife. At the margin of some areas are very steep areas of Fairpoint soils or sloping areas of Bethesda soils, which have not been reclaimed after surface mining. A few areas have been covered with soil material and support plants. Sediments from toxic spoil are in a few areas along streams. Also included are areas near Philo that contain industrial waste, such as fly ash and foundry sand.

Mine pits and mine dumps have poor physical properties for plant growth, and most areas are barren. The surface layer is very acid because it contains weathering pyrite, which releases sulfuric acid. Runoff is slow to rapid. Plants are unable to survive because of the extreme acidity and the accompanying toxic levels of elements, such as iron, aluminum, and manganese. Mine gob has a high content of organic carbon but has a very low content of humus, which is commonly in unmined soils. The oxidized material has a very low content of organic carbon and does not contain organic matter. Available water capacity is low or very low in both materials. Water percolating through the acid material is a source of acid stream pollution in many areas.

Most areas of mine dumps and pits are now abandoned or are used as wildlife habitat. The absence of cover in these areas makes them very susceptible to erosion. Sediment and runoff from these areas contribute directly to acid drainage problems in nearby streams.

Areas of this map unit can be reclaimed. Grading helps to control runoff and provides a surface where machinery can be used. The graded surface can be blanketed with less acid spoil, fly ash, or surface soil material. Applications of lime can temporarily reduce acidity, but the further release of sulfuric acid causes the soil material to become extremely acid within a few years.

In their present condition, areas of this map unit are unsuited to crops or pasture. With proper reclamation, these areas can support some vegetation but are not likely to produce enough forage for pasture. Reclaimed areas could support trees. Trees would grow very slowly, and some would be likely to die as their root systems reached the toxic materials.

Areas of this map unit are not suited to building site development or septic tank absorption fields because of uneven settlement and the extreme acidity, which damage building materials and injure landscape plantings. The suitability of some areas can improve following complete settling and reclamation.

No land capability classification, pasture and hayland suitability group, or woodland ordination symbol is assigned.

FaB—Fairpoint silty clay loam, 1 to 15 percent slopes. This deep, nearly level to strongly sloping, well drained soil is on mine spoil ridgetops and benches in

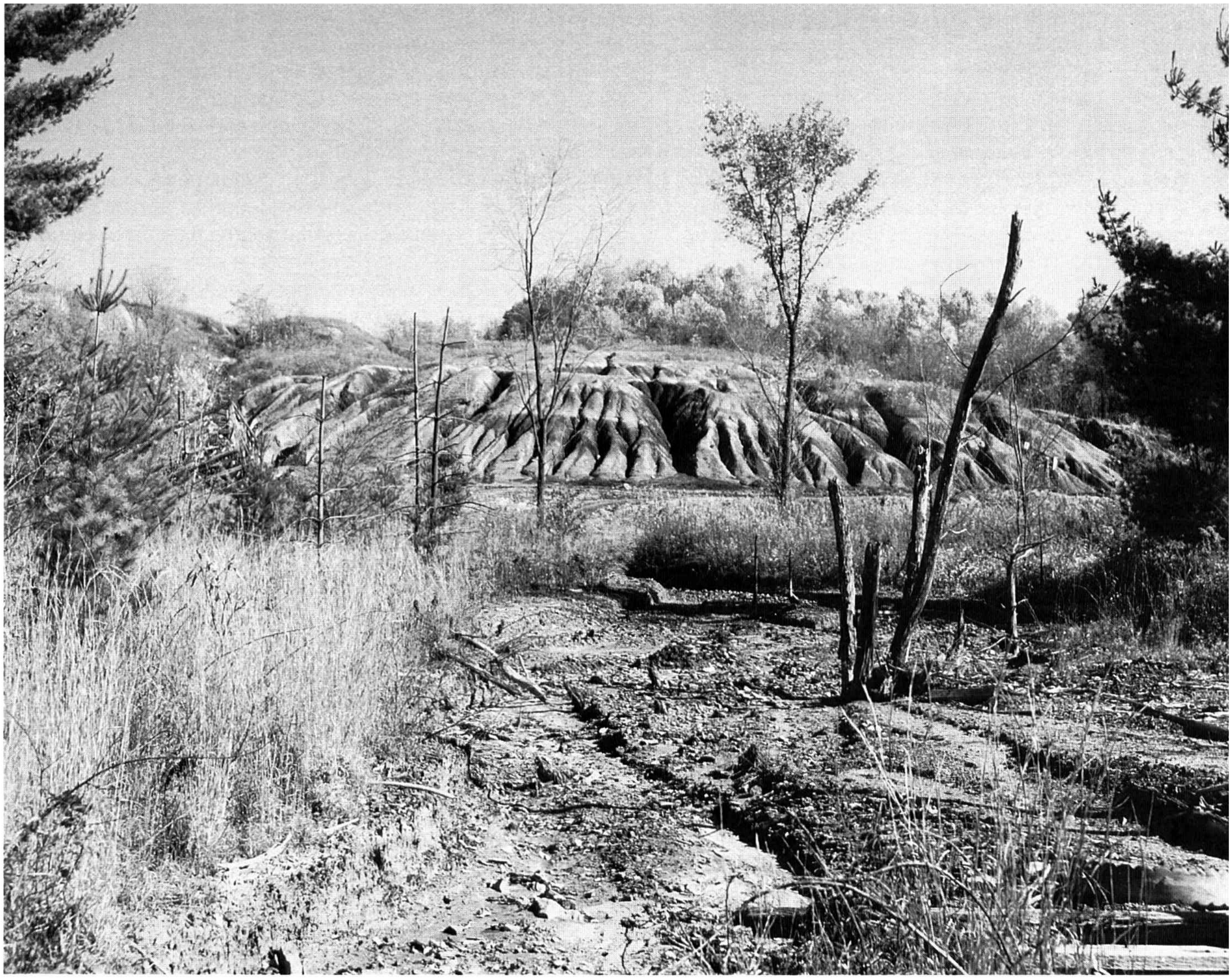

Figure 9.—Barren, eroding areas of mine spoil in a former coal loading area. Mine pits and dumps produce large volumes of sediment and acid mine drainage.

reclaimed areas that were formerly surface-mined for coal. Areas of this soil have been graded to the approximate contour of the original soil, and the surface layer has been blanketed with a layer of natural soil material. The underlying material is a mixture of rock fragments and partially weathered fine earth material that was in or below the profile of the original soil. The rock fragments are mostly siltstone, shale, and sandstone, but they include some limestone, carbonaceous shale, and coal. Gullies have formed in a few areas. Slopes are mostly smooth and convex. Individual areas are oval and range from 3 to 50 acres in size.

Typically, the surface layer is mixed dark brown and yellowish brown, firm silty clay loam about 7 inches thick. The underlying material extends to a depth of 60 inches or more. The upper part, to a depth of about 16 inches, is mixed yellowish brown and dark grayish brown, firm shaly silty clay loam. The lower part is dark gray and brown, firm very shaly silty clay loam. Some areas are more acid, and other areas are more alkaline. In some areas the surface layer is channery silty clay loam. The channers in these areas interfere with tillage.

Included with this soil in mapping are some areas where the surface has been covered with 18 to 30 inches of natural soil material. These areas have a higher available water capacity than the Fairpoint soil and are more productive. They make up about 20 percent of most delineations.

Permeability is moderately slow in the underlying material of the Fairpoint soil. Runoff is slow or medium. Available water capacity is low because of the high content of coarse fragments and the density of the underlying material. The surface layer is sticky when wet and has a low content of organic matter. The root zone is shallow or moderately deep, depending on the density of the underlying material.

Most areas are used for hay.

This soil is only moderately suited to cultivated crops. It is droughty, and erosion is a hazard. The droughtiness, erosion, tilth, and the content of organic matter are management concerns. The hazard of erosion is moderate in cultivated areas. Using no-till farming methods or a system of conservation tillage that leaves crop residue on the surface conserves moisture, helps to control erosion, improves tilth, and increases the content of organic matter. Cover crops, a cropping system that includes grasses and legumes, and contour stripcropping also reduce the hazard of erosion. The dense underlying material restricts water movement and slows the drying and warming of the soil in the spring. Limiting fieldwork when the soil is too wet helps to prevent compaction of the surface layer. Surface and subsurface drains are moderately effective in reducing wetness in scattered low areas.

This soil is only moderately suited to hay and pasture. Species that can tolerate droughtiness are the best suited. The soil remains soft until it dries in late spring. Grazing when the surface layer is wet can damage plant roots. If the soil is cultivated, the hazard of erosion is moderate. Seeding companion crops, adding mulch, or using no-till seeding methods can reduce the hazard of erosion.

This soil is only moderately suited to timber production. The coarse fragments in the soil affect the planting and growth of trees. Using inoculated seedlings that have been transplanted once and mulching around the seedlings reduce the seedling mortality rate.

This soil is subject to uneven settlement for several years after reclamation. After it has settled, the soil is moderately suited to use as a site for buildings. The depth to bedrock and the control of storm-water runoff are management concerns. Large stones in the soil can hinder excavation. Onsite investigation is needed to determine the suitability of individual areas for building site development. Removing as little vegetation as possible and reseeding exposed areas can help to control erosion on construction sites.

After it has settled, this soil is only poorly suited to septic tank absorption fields. The restricted permeability and the content of coarse fragments are limitations. Enlarging the absorption field or using a double field improves the filtering capacity of the soil. Establishing the lines across the slope can prevent the surfacing of effluent. Large rocks should be excluded from the material used to cover the lines.

Ponds can be excavated in low areas. Onsite investigation is needed to determine the nature of the underlying material. Ridgetops have a limited watershed area.

The land capability classification is IIIs. The pasture and hayland suitability group is B-4. No woodland ordination symbol is assigned.

FaD—Fairpoint silty clay loam, 15 to 25 percent slopes. This deep, moderately steep, well drained soil is on hillsides of graded mine spoil in reclaimed areas that were formerly surface-mined for coal. It has been graded to the approximate contour of the original soil, and the surface has been blanketed with a layer of natural soil material (fig. 10). Slopes are convex, long, and smooth. The underlying material is a mixture of rock fragments and partially weathered fine earth material that was in or below the profile of the original soil. The rock fragments are mostly siltstone, shale, and sandstone but include limestone, carbonaceous shale, and coal. Most areas range from 10 to 100 acres in size.

Typically, the surface layer is brown and yellowish brown, firm silty clay loam about 6 inches thick. The underlying material to a depth of 60 inches or more is light brownish gray, brown, and gray, firm very shaly silty clay loam. In some places the surface layer is channery silty clay loam. In other places the soil is very acid. In a few areas the underlying material is alkaline. A few eroded areas have gullies that are 1 or 2 feet deep.

Included with this soil in mapping are some areas where the surface has been covered with 18 to 30 inches of natural soil material. These areas have a higher available water capacity than the Fairpoint soil and are more productive. They make up about 20 percent of most delineations.

Permeability is moderately slow in the Fairpoint soil. Runoff is rapid or very rapid. Available water capacity is low. The surface layer is sticky when wet and has a low content of organic matter. The root zone is shallow or moderately deep, depending on the density of the underlying material.

Most of the acreage supports grasses and legumes, but only a small acreage is grazed or harvested for hay.

This soil is poorly suited to cultivated crops. Droughtiness, erosion, tilth, and the content of organic matter are management concerns. The hazard of

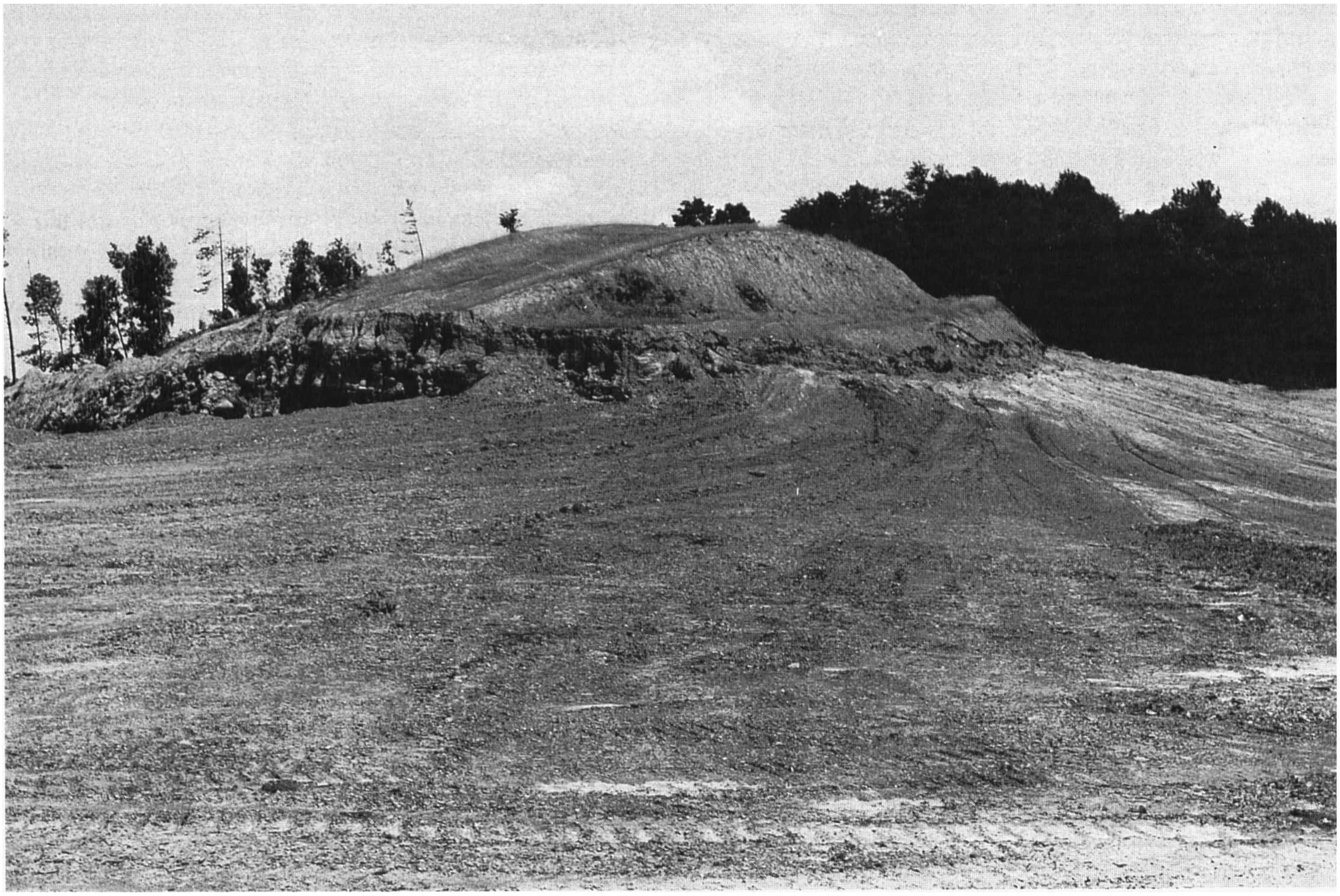

Figure 10.—Spoil material in an area of Fairpoint silty clay loam, 15 to 25 percent slopes, that has been graded and pushed back against the highwall. In the final stage of reclamation, the topsoil, which is stockpiled above the highwall, will be reseeded with grasses and legumes after it has been spread over the spoil.

erosion is very severe in cultivated areas. Using no-till farming methods or a system of conservation tillage that leaves crop residue on the surface conserves moisture, helps to control erosion, improves tilth, and increases the content of organic matter. Cover crops, a cropping system that includes grasses and legumes, and contour stripcropping also help to control erosion. The dense underlying material restricts water movement and slows the drying and warming of the soil in the spring. Limiting fieldwork when the soil is too wet minimizes surface compaction.

This soil is only moderately suited to hay and pasture. Droughtiness is a management concern. Forage species that can tolerate droughtiness are the most suitable for planting. Production is low during dry periods. The soil remains soft until it dries out in late spring. Grazing when the soil is soft can damage plant roots. If the soil is cultivated, the hazard of erosion is severe. Seeding cover crops or companion crops, adding mulch, or using no-till seeding methods reduces the hazard of erosion. The hazard of erosion can be severe in pastures where bare spots have developed because of overgrazing.

This soil is only moderately suited to timber production. The aspect of the slope and the coarse fragments in the soil affect the planting and growth of trees. Coves and north- and east-facing slopes are the best woodland sites. They have cooler temperatures and more available water than other sites because they are less exposed to the sun and prevailing winds. Species that can tolerate droughty conditions should be selected for planting. Maintaining a cover of grasses and legumes helps to control erosion until the trees become established. Using inoculated seedlings that have been transplanted once and mulching around the seedlings reduce the seedling mortality rate, especially on south-facing slopes. The slope limits the use of some planting and logging equipment. Establishing roads and skid trails on the contour, establishing water bars, and maintaining a vegetative cover help to control erosion.

This soil is subject to uneven settlement for several years after reclamation. After it has settled, the soil is poorly suited to use as a site for buildings because of the slope. Designing buildings so that they conform to the natural slope of the land reduces the need for excavation. Maintaining a vegetative cover can minimize runoff and erosion on construction sites.

This soil is generally unsuited to septic tank absorption fields because of the slope and the restricted permeability.

The suitability of this soil for ponds varies because of the mixed nature of the underlying material. Onsite investigation is needed. Water in excavated ponds is likely to have a high content of sediment.

The land capability classification is IVs. The pasture and hayland suitability group is B-4. No woodland ordination symbol is assigned.

FaE—Fairpoint silty clay loam, 25 to 50 percent slopes. This deep, steep and very steep, well drained soil is on hillsides of graded mine spoil in reclaimed areas that were formerly surface-mined for coal. It has been graded to the approximate contour of the original soil, and the surface has been blanketed with a layer of natural soil material. The underlying material is a mixture of rock fragments and partially weathered fine earth material that was in or below the profile of the original soil. Rock fragments are mostly subrounded siltstone, sandstone, and shale but include small amounts of limestone and carbonaceous shale. In some areas the highwalls have been covered. Slopes are long and smooth. Most areas are fan shaped and range from 3 to 50 acres in size.

Typically, the surface layer is mixed brown, dark brown, yellowish brown, and dark yellowish brown, firm silty clay loam about 6 inches thick. The underlying material to a depth of 60 inches or more is mixed yellowish brown and dark gray, firm very channery silt loam, clay loam, and loam. The content of siltstone, sandstone, and shale fragments in the underlying material ranges from 25 to 70 percent. In some areas the soil is extremely acid, and in other areas it is mildly alkaline.

Included with this soil in mapping are small areas of soils that have a surface layer of channery silty clay loam and eroded areas that have numerous rills, small gullies, or landslides. Included areas make up about 20 percent of most delineations.

Permeability is moderately slow in the underlying material of the Fairpoint soil. Runoff is very rapid. Available water capacity is low because of the content of coarse fragments. The surface layer is sticky when wet and has a low content of organic matter. Roots are restricted by dense layers in the underlying material, and the rooting depth is variable.

Most of the acreage supports grasses and legumes, but only a small acreage is grazed. In some areas, shrubs have been planted to provide habitat for wildlife.

This soil is generally unsuited to cultivated crops because of droughtiness, the slope, and a very severe hazard of erosion.

This soil is poorly suited to hay and pasture. Droughtiness is a management concern. Forage plants that can tolerate droughtiness are the most suitable for planting. Production is very low during dry periods. The soil remains soft until late spring. Grazing when the soil is soft can damage plant roots. Seeding cover crops or companion crops, adding mulch, or using no-till seeding methods reduces the hazard of erosion. After forage crops are established, a dense sod should be maintained. Erosion can be severe in areas where bare spots have developed.

This soil is only moderately suited to timber production. The aspect of the slope and the coarse fragments in the soil affect the planting and growth of trees. Coves and north- and east-facing slopes are the best woodland sites. They have cooler temperatures and more available water than other sites because they are less exposed to the sun and prevailing winds. Species that can tolerate droughty conditions should be selected for planting. Maintaining a cover of grasses and legumes helps to control erosion until the trees become established. Using inoculated seedlings that have been transplanted once and mulching around the seedlings reduce the seedling mortality rate, especially on south-facing slopes. The slope limits the use of planting and logging equipment. Establishing roads and skid trails on the contour helps to control erosion. Establishing water bars also helps to control erosion.

This soil is generally unsuited to use as a site for buildings or for septic tank absorption fields because of the slope, uneven settlement, and the moderately slow permeability.

Most areas of this soil are unsuited to the development of ponds because they are underlain by rock or porous spoil material.

The land capability classification is VIe. The pasture and hayland suitability group is E-2. No woodland ordination symbol is assigned.

FbF—Fairpoint channery silty clay loam, 25 to 70 percent slopes. This deep, steep and very steep, well drained soil is on ungraded ridges and trenches of mine spoil in areas that have been surface-mined for coal or limestone. In most areas the ridges are continuous and very steep and are about 40 to 60 feet high. The soil is a mixture of rock fragments and partially weathered fine earth material that was in or below the profile of the original soil. Most of the rock fragments are flat and are less than 10 inches long. Stones and boulders are common on the surface. Individual areas of this soil are crescent shaped and range from 10 to 250 acres in size.

Typically, the surface layer is dark grayish brown, friable channery silty clay loam about 4 inches thick. The underlying material to a depth of 60 inches or more is yellowish brown, brown, and grayish brown, mottled, friable very channery and extremely channery silty clay loam. In some areas the soil is extremely acid, and in other areas it is moderately alkaline. In some places the surface layer is shaly. A few places have slopes of only 8 to 25 percent.

Included with this soil in mapping are a few areas of the loamy Udorthents. These soils have fewer coarse fragments and a higher available water capacity than the Fairpoint soil. Also included are small areas of mine dumps and pits that are toxic to plants and pools of shallow water between ridges and along highwalls. Included areas make up less than 20 percent of most delineations.

Permeability is moderately slow in the underlying material of the Fairpoint soil. Runoff is very rapid. Available water capacity is low. The content of organic matter also is low. Roots are restricted by dense layers in the underlying material. The potential for frost action and the shrink-swell potential are moderate.

Most areas support plantations of native hardwoods, such as black locust, yellow-poplar, oak, and aspen.

This soil is unsuited to row crops, small grain, hay, or pasture because of the slope, droughtiness, and a very severe hazard of erosion.

This soil is only moderately suited to timber production. The aspect of the slope and the coarse fragments in the soil affect the planting and growth of trees. Coves and north- and east-facing slopes are the best woodland sites. They have cooler temperatures and more available water than other sites because they are less exposed to the sun and prevailing winds. Species that can tolerate droughty conditions should be selected for planting. Maintaining a cover of grasses and legumes helps to control erosion until the trees become established. Using inoculated seedlings that have been transplanted once and mulching around the seedlings reduce the seedling mortality rate, especially on south-facing slopes. The slope and the stones on the surface restrict the use of planting and logging equipment. Establishing roads and skid trails on the contour and establishing water bars help to control erosion.

This soil is generally unsuited to use as a site for buildings or for septic tank absorption fields because of the slope, uneven settlement, and the moderately slow permeability.

Ponds and wildlife marshes can be developed in some of the trenches between the spoil ridges. Onsite investigation is needed to determine the nature of the underlying material. Water in the ponds is likely to have a high content of sediment.

The land capability classification is VIIe. The pasture and hayland suitability group is H-1. No woodland ordination symbol is assigned.

FcA—Fitchville silt loam, 0 to 2 percent slopes. This deep, nearly level, somewhat poorly drained soil is on terraces in the valleys of former glacial lakes. Most areas are irregular in shape and range from 10 to 150 acres in size.

Typically, the surface layer is dark grayish brown, friable silt loam about 10 inches thick. The subsoil is about 48 inches thick. It is mottled. The upper part is brown, friable silty clay loam, and the lower part is brown and pale brown, firm silty clay loam. The underlying material to a depth of 70 inches or more is yellowish brown, mottled, firm silty clay loam. Some areas are poorly drained. In some places the subsoil and underlying material have more clay. In a few areas the underlying material is sandy loam or loam.

Included with this soil in mapping are areas of Luray, Lorain, Glenford, Newark, and Killbuck soils. The very poorly drained Luray and Lorain soils are in depressions. They have a very dark surface layer. The moderately well drained Glenford soils are in the more sloping landscape positions. Newark and Killbuck soils are on small alluvial fans. They are subject to occasional flooding. Also included are a few areas that have a subsoil of sandy loam or loam and areas in the flood pool of the Dillon Lake dam that are subject to controlled flooding. Included areas make up about 20 percent of most delineations.

Permeability is moderately slow in the Fitchville soil. Runoff is slow. Available water capacity is high. The content of organic matter is moderate in the surface layer. A seasonal high water table is perched in the upper part of the subsoil during extended wet periods. The rooting depth is restricted by the high water table. The potential for frost action is high.

Most areas are used as cropland or pasture.

If drained, this soil is well suited to cultivated crops.

Subsurface drains can lower the seasonal high water table. Commonly, a complete drainage system is needed. Grassed waterways and open ditches can divert runoff from adjacent soils on uplands to natural drainageways or to other ditches. The hazard of erosion is slight in cultivated areas. If the soil is cultivated, surface crusting after rains reduces the rate of water infiltration and retards the emergence of seedlings. Using a system of conservation tillage, such as no-till farming, that leaves crop residue on the surface, including grasses and legumes in the cropping system, and planting cover crops increase the content of organic matter and improve tilth. Limiting fieldwork when the surface layer and subsoil are too wet helps to minimize compaction.

If drained, this soil is well suited to hay. Few areas are drained sufficiently for the sustained production of alfalfa. Species that can tolerate seasonal wetness are the best suited. In areas that have not been drained, the soil is moderately suited to pasture. Production can be improved by seeding a mixture of grasses and legumes that can tolerate wetness. Deferred grazing during wet seasons helps to prevent compaction of the surface layer and damage to plant roots.

This soil is well suited to timber production. No major limitations affect the planting or growth of trees. The soil has low strength when wet and cannot support heavy equipment. Spreading aggregate on haul roads or log landings helps to stabilize the surface. Species that can tolerate wetness should be selected for planting. Plant competition can be controlled by removing vines and the less desirable trees and shrubs.

This soil is poorly suited to building site development. The seasonal wetness is the main limitation. It can be reduced by using surface and subsurface drains. Waterproofing basement walls, installing drains at the base of footings, and using sump pumps help to keep basements dry. Surface water should be diverted away from building sites.

This soil is poorly suited to septic tank absorption fields because of the seasonal wetness and the moderately slow permeability. Perimeter drains can reduce the wetness if suitable drainage outlets are available. Enlarging the absorption area or installing a double absorption field system helps to overcome the restricted permeability.

There are very few natural pond sites. The ability of excavated ponds to hold water varies considerably. Careful onsite investigation is needed.

In areas that have not been drained, this soil is recognized as farmland of local importance. The land capability classification is IIw. The pasture and hayland suitability group is C-1. The woodland ordination symbol is 5A.

FcB—Fitchville silt loam, 2 to 6 percent slopes. This deep, gently sloping, somewhat poorly drained soil is on slightly dissected terraces in the valleys of former glacial lakes. Some areas at the margin of the filled valleys are on alluvial fans. Most areas are irregular in shape and range from 5 to 40 acres in size.

Typically, the surface layer is dark grayish brown, friable silt loam about 14 inches thick. The subsoil is brown and pale brown, firm silt loam about 36 inches thick. The underlying material to a depth of 70 inches or more is yellowish brown, firm silty clay loam. Some areas where intermittent streams emerge from upland ravines are subject to rare flooding and have a surface layer of silt loam or clay loam alluvium that is 6 to 24 inches thick. In a few areas the subsoil is sandy loam or loam. In a few places the underlying material is sandy loam, loam, or silty clay.

Included with this soil in mapping are areas of Luray, Glenford, and McGary soils. The very poorly drained Luray soils are in drainageways and depressions. They have a very dark surface layer. The moderately well drained Glenford soils are on the crest of small knolls. McGary soils have more clay in the subsoil and underlying material than the Fitchville soil. Also included are areas in the flood pools of the Wills Creek dam and the Dillon Lake dam that are subject to controlled flooding. Included soils make up about 20 percent of most delineations.

Permeability is moderately slow in the Fitchville soil. Runoff is medium. Available water capacity is high. The content of organic matter is moderate in the surface layer. Tilth is good. The capacity to store and release plant nutrients is moderate. A seasonal high water table is perched in the upper part of the subsoil during extended wet periods. It restricts the rooting depth. The potential for frost action is high.

Most areas are used as cropland. Some areas are used as pasture. A few areas are used as second-growth woodland.

If drained, this soil is well suited to cultivated crops. The hazard of erosion is moderate in cultivated areas. Using a system of conservation tillage that leaves crop residue on the surface, cultivating across the slope, and planting cover crops help to control erosion. Channeling intermittent streams into grassed waterways helps to prevent gullying. If outlets are available, properly installed subsurface drains can lower the water table. Commonly, a complete drainage system is needed. Large amounts of surface water cross areas of this soil. Commonly, overloaded natural channels fill with sediment and new channels form. Diversions or retention basins can be used to control surface water and trap sediment (fig. 11). The root zone can be increased and crops can be planted earlier if channels

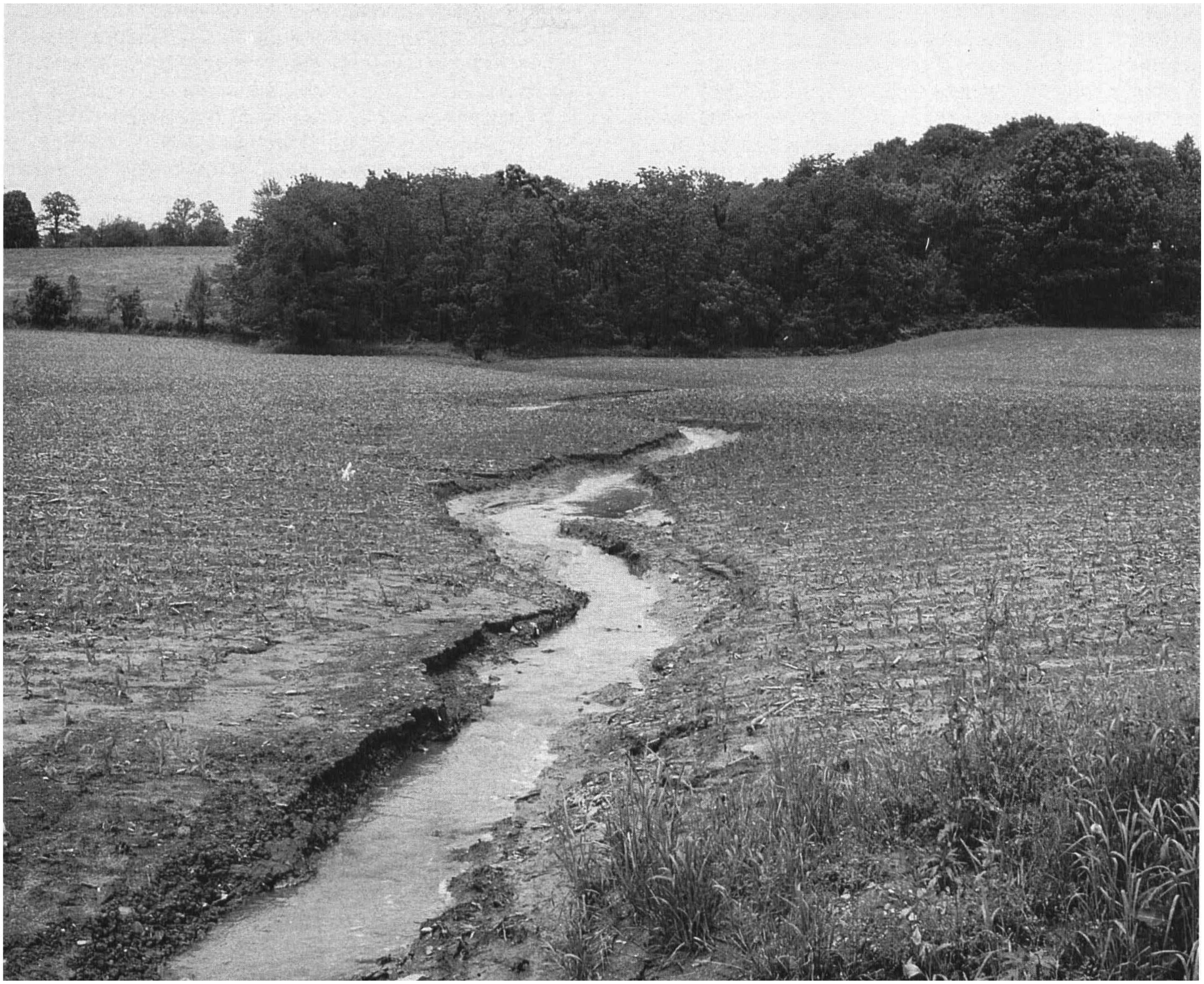

Figure 11.—A gully that formed during a rainstorm in an area of Fitchville silt loam, 2 to 6 percent slopes. Sediment-control basins help to control runoff from upland areas and thus help to prevent this kind of erosion.

are stabilized with a permanent cover of grasses and if seep flow is routed through subsurface drains. The surface layer crusts after heavy rains. Working the soil when it is soft and wet can result in excessive compaction of the surface layer.

If drained, this soil is well suited to hay. Few areas are drained sufficiently for the sustained production of alfalfa. Species that can tolerate seasonal wetness are the best suited. The quality of hay may be reduced in areas that are subject to overwashing.

In areas that have not been drained, this soil is moderately suited to pasture. Production can be improved by seeding a mixture of grasses and legumes that can tolerate wetness. Deferring grazing during wet seasons helps to prevent compaction of the surface layer and damage to plant roots.

This soil is well suited to timber production. No major limitations affect the planting or growth of trees. The soil has low strength when wet and cannot support heavy equipment. Spreading aggregate on haul roads or log landings helps to stabilize the surface. Species that can tolerate wetness should be selected for planting. Plant competition can be controlled by removing vines and the less desirable trees and shrubs.

This soil is poorly suited to use as a site for buildings. Seasonal wetness is the main limitation. Surface and subsurface drains can reduce the wetness. Waterproofing basement walls, installing drains at the base of footings, and using sump pumps help to keep basements dry. Surface water from adjacent slopes should be diverted away from the building site.

This soil is poorly suited to septic tank absorption fields. The seasonal wetness and the restricted permeability are limitations. Perimeter drains can reduce the wetness by lowering the water table if drainage outlets are available. Enlarging the field or installing a double absorption field system helps to overcome the restricted permeability. Surface water should be excluded from the absorption field area.

There are few natural pond sites. The ability of excavated ponds to hold water varies considerably from one area to another. Careful onsite investigation is needed.

In areas that have not been drained, this soil is recognized as farmland of local importance. The land capability classification is IIe. The pasture and hayland suitability group is C-1. The woodland ordination symbol is 5A.

FkB—Frankstown Variant-Mertz complex, 3 to 8 percent slopes. These gently sloping, well drained soils are on the ridgetops of Flint Ridge. Most areas are about 45 percent Frankstown Variant silt loam and 35 percent Mertz very cherty silt loam. The two soils are intermingled in such an intricate pattern that it is not practical to separate them in mapping. Most areas are oblong and range from 5 to 40 acres in size.

The Frankstown Variant soil is moderately deep. Typically, the surface layer is dark brown, friable silt loam about 4 inches thick. The subsoil is about 18 inches thick. The upper part is yellowish brown, friable and firm silt loam. The lower part is yellowish brown, firm cherty silt loam. Flint bedrock is at a depth of about 22 inches.

The Mertz soil is deep. Typically, the surface layer is brown, friable very cherty silt loam about 6 inches thick. The subsoil is about 42 inches thick. The upper part is yellowish brown, friable cherty silt loam. The lower part is strong brown, firm very cherty silty clay loam. The underlying material to a depth of 60 inches or more is strong brown, firm channery silty clay loam.

Included with these soils in mapping are areas that are shallow over flint bedrock and areas that have a very stony or bouldery surface layer. Also included are areas of the moderately well drained Aaron and Keene soils in landscape positions similar to or slightly higher than those of the Frankstown Variant and Mertz soils. Included areas make up about 20 percent of most delineations.

Permeability is moderate in the Frankstown Variant soil and moderately slow in the Mertz soil. Runoff is medium on both soils. Available water capacity is low in the Frankstown Variant soil and moderate in the Mertz soil. The content of organic matter is moderately low in the surface layer of both soils. The root zone is moderately deep in the Frankstown Variant soil and deep in the Mertz soil. Both soils have a moderate capacity to store and release plant nutrients.

Most areas of these soils have been cleared of stones and are cultivated. The stones are piled at the borders of fields or are on nearby steep slopes.

These soils are only moderately suited to cultivated crops and to forage plants. Fertility, droughtiness, and erosion are management concerns. The hazard of erosion is moderate in cultivated areas. The Frankstown Variant soil is droughty. Most fields have been partially cleared of chert fragments. The remaining chert fragments and the included very stony areas hinder the use of farm equipment. The soils dry readily and warm up early in the spring. In cultivated areas, surface crusting after rains reduces the rate of water infiltration and retards the emergence of seedlings. Using a system of conservation tillage, such as no-till farming, that leaves crop residue on the surface helps to control erosion and conserves moisture. Including grasses and legumes in the cropping system, planting cover crops, tilling on the contour, and establishing grassed waterways also reduce the hazard of erosion. Limiting fieldwork when the surface layer and subsoil are too wet helps to minimize compaction.

These soils are well suited to hay and pasture. The roots of some species are restricted by bedrock in the Frankstown Variant soil. The soils warm up early in spring and produce good early season pasture. Droughtiness later in the growing season reduces the production of forage plants. If the soils are plowed, the hazard of erosion is moderate. Seeding companion crops, adding mulch, or using no-till seeding methods reduces the hazard of erosion. More moisture is available for seed germination in the spring than later in the growing season.

These soils are only moderately suited to timber production. The bedrock and the low available water capacity in the Frankstown Variant soil reduce the growth rate of plants during dry periods. Stones on the surface of the Mertz soil limit the use of some types of equipment. The hazard of windthrow can be reduced by using logging techniques that do not leave the

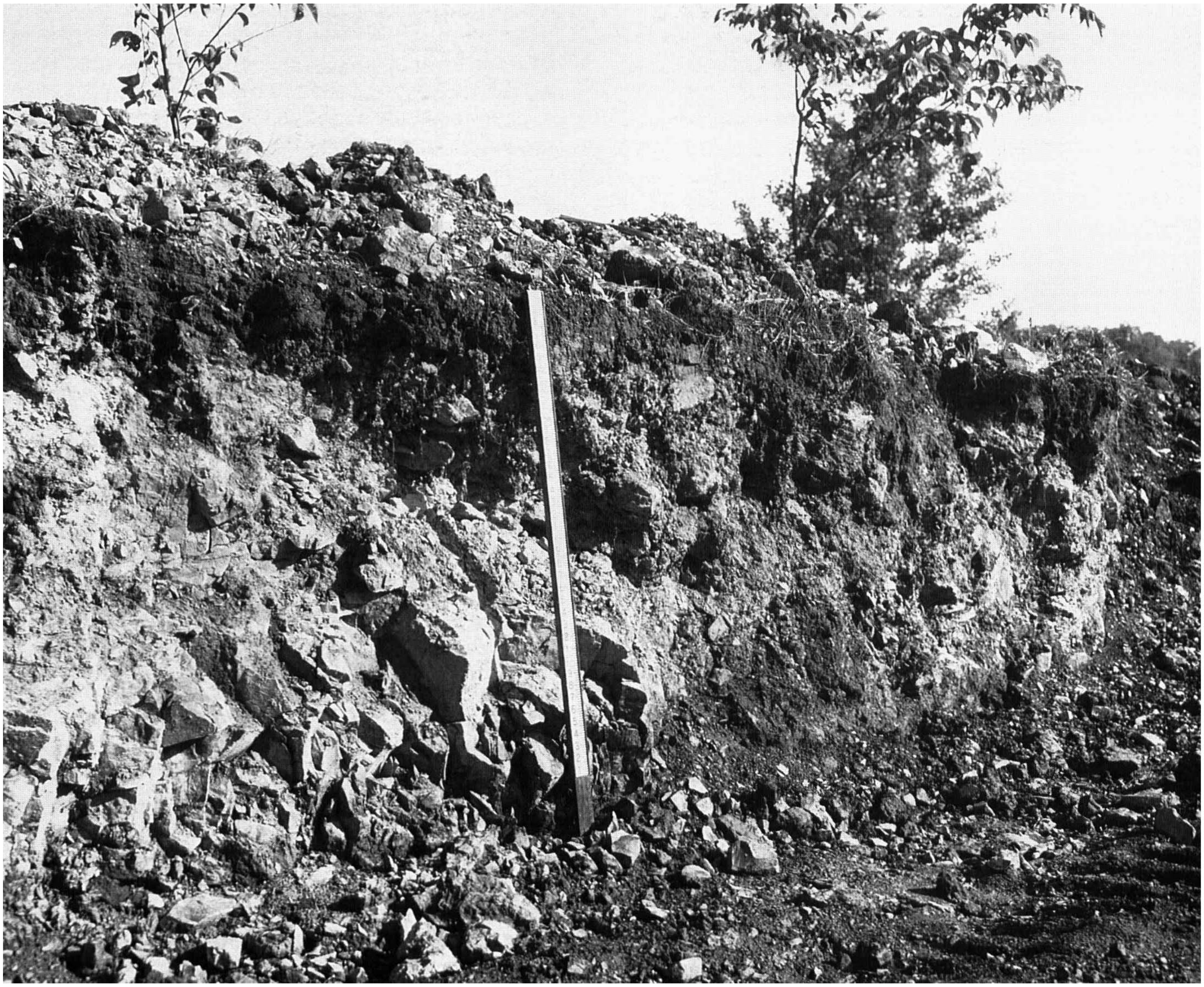

Figure 12.—Bedrock in the moderately deep Frankstown Variant soil is exposed in this basement excavation in an area of Frankstown Variant-Mertz complex, 3 to 8 percent slopes. The Frankstown Variant soil is on the left side of the measuring rod, and the Mertz soil is on the right. Note the deep, very cherty subsoil in the Mertz soil.

remaining trees widely spaced. Plant competition on the Mertz soil can be controlled by removing vines and the less desirable trees and shrubs.

The Mertz soil is well suited to use as a site for buildings. The Frankstown Variant soil is poorly suited to use as a site for buildings with basements because the hard flint bedrock severely limits excavation for utility lines and basements (fig. 12). This soil is better suited to dwellings without excavated basements. Maintaining a vegetative cover on construction sites can minimize runoff and erosion.

These soils are poorly suited to septic tank absorption fields because of the depth to bedrock in the Frankstown Variant soil and the moderately slow permeability in the Mertz soil. Effluent that enters the fractured bedrock can pollute ground water. Enlarging the absorption field or using a double field helps to overcome the restricted permeability in the Mertz soil. Areas of the shallower Frankstown Variant soil should not be used for absorption fields.

The potential for ponds is very low. Excavation is limited by the very hard bedrock and by large, loose rocks. Because of the position of the soils on ridgetops, the watershed area is limited.

These soils are recognized as farmland of local importance. The land capability classification is IIe. The pasture and hayland suitability group is F-1 for the Frankstown Variant soil and B-1 for the Mertz soil. The woodland ordination symbol is 4D for the Frankstown Variant soil and 4F for the Mertz soil.

GdB—Gilpin silt loam, 2 to 8 percent slopes. This moderately deep, gently sloping, well drained soil is mainly on shoulder slopes and nose slopes of dissected upland ridgetops. Resistant beds of sandstone or siltstone shape the local relief. Slopes are smooth and slightly convex. Most areas range from 3 to 60 acres in size.

Typically, the surface layer is brown, friable silt loam about 9 inches thick. The subsoil is yellowish brown, friable silt loam, clay loam, and channery clay loam about 21 inches thick. Light olive brown, fractured siltstone, soft shale, and fine grained sandstone bedrock is at a depth of about 30 inches. In some areas the subsoil is less acid. In places the subsoil is sandy loam and channery sandy loam. Small areas of deep, well drained soils are on the wider ridgetops.

Included with this soil in mapping are areas of the moderately well drained Keene soils and areas of severely eroded soils. Keene soils are on benches. The severely eroded soils are on shoulders and narrow ridges. They are shallow over bedrock and have a surface layer of channery silt loam. Also included are a few areas that are underlain by limestone bedrock. Included areas make up about 20 percent of most delineations.

Permeability is moderate in the Gilpin soil. Runoff is medium. Available water capacity is low. The root zone is restricted by the moderate depth to bedrock. The capacity to store and release plant nutrients is moderate.

Most areas are used for crops or pasture. A small acreage is wooded.

This soil is well suited to cultivated crops and forage plants. Fertility, droughtiness, and erosion are management concerns. The hazard of erosion is moderate in cultivated areas. The soil dries readily and is well suited to early spring crops. If the soil is cultivated, surface crusting after rains reduces the rate of water infiltration and retards the emergence of seedlings. Using a system of conservation tillage, such as no-till farming, that leaves crop residue on the surface helps to control erosion and conserves moisture. Including grasses and legumes in the cropping system, planting cover crops, tilling on the contour, stripcropping, and establishing grassed waterways also help to control erosion. Limiting fieldwork when the surface layer and subsoil are too wet helps to minimize compaction.

This soil is well suited to hay and pasture. The roots of some species are restricted by the bedrock. The soil warms up early in spring and produces good early season forage. Forage production is reduced by droughtiness later in the growing season. If the soil is plowed, the hazard of erosion is moderate. Seeding companion crops, adding mulch, or using no-till seeding methods reduces the hazard of erosion.

This soil is well suited to timber production. No major limitations affect the planting, growth, or harvesting of trees. Species that can tolerate drought should be selected for planting.

This soil is well suited to use as a site for buildings. The depth to bedrock is a limitation on sites for dwellings with basements. The upper part of the bedrock, to a depth of a few feet, is generally rippable with power equipment.

This soil is poorly suited to conventional septic tank absorption fields because of the limited depth to bedrock. Effluent that enters the fractured bedrock can pollute ground water. Some included areas of the deeper, well drained soils are better suited to this use. Using a mound system can increase the filtering capacity of the absorption field.

There are few natural pond sites. Excavated ponds commonly are not practical because of the limited depth to bedrock.

The land capability classification is IIe. The pasture and hayland suitability group is F-1. The woodland ordination symbol is 4A.

GdC2—Gilpin silt loam, 8 to 15 percent slopes, eroded. This moderately deep, strongly sloping, well drained soil is on shoulder slopes and nose slopes on narrow or dissected upland ridgetops. Erosion has removed part of the original surface layer and reduced the thickness of the subsoil. Slopes are smooth, but a few shallow drainageways are near the edge of some areas. Individual areas of this soil are long and sinuous and range from 3 to 60 acres in size.

Typically, the surface layer is brown, friable silt loam about 6 inches thick. The subsoil is brown, firm silt loam and channery silt loam about 16 inches thick. Hard, fine grained siltstone bedrock is at a depth of about 22 inches. Many areas are less acid. Some areas that are severely eroded have a surface layer of channery silt loam. In places the soil is deeper over bedrock.

Included with this soil in mapping are small areas of Lowell, Wellston, Rigley, and Berks soils. The deep Lowell and Wellston soils are commonly near the center of the wider ridgetops. Rigley soils are sandier than the Gilpin soil. They are in a few narrow bands on the shoulders of some ridgetops. Berks soils have a very channery subsoil. Also included are areas that have hard bedrock at a depth of less than 20 inches. Included areas make up about 20 percent of most delineations.

Permeability is moderate in the Gilpin soil. Runoff is rapid. Available water capacity is low. The content of organic matter is moderately low in the surface layer. The root zone is restricted by the moderate depth to bedrock. The capacity to store and release plant nutrients is moderate.

Most areas are used for hay or pasture. Some areas are used for cultivated crops.

This soil is only moderately suited to cultivated crops. Erosion and droughtiness are the main management concerns. Many areas are significantly eroded. The hazard of erosion is severe in cultivated areas. The soil dries readily and is well suited to early spring crops. If the soil is cultivated, surface crusting after rains reduces the rate of water infiltration and retards the emergence of seedlings. Using a system of conservation tillage, such as no-till farming, that leaves crop residue on the surface helps to control erosion and conserves moisture. Including grasses and legumes in the cropping system, planting cover crops, tilling on the contour, stripcropping, and establishing grassed waterways reduce the hazard of erosion. Limiting fieldwork when the surface layer and subsoil are too wet helps to minimize compaction.

This soil is well suited to hay and pasture. The roots of some forage plants are restricted by the bedrock. The soil warms up early in spring and is well suited to early season pasture. Forage production is reduced by droughtiness later in the growing season. If the soil is plowed, the hazard of erosion is moderate. Seeding companion crops, adding mulch, or using no-till seeding methods can reduce the hazard of erosion.

This soil is well suited to timber production. No major limitations affect the planting, growth, or harvesting of trees. Species that can tolerate drought should be selected for planting.

This soil is well suited to use as a site for buildings. Natural drainage is good. The moderate depth to bedrock and the slope are management concerns. In some areas, bedrock at a depth of 20 to 40 inches interferes with excavation for basements and utility lines. Commonly, the bedrock is shattered enough to be excavated without blasting. Erosion is a hazard during construction. Maintaining as much vegetation on the site as possible helps to control erosion.

This soil is poorly suited to conventional septic tank absorption fields. The soil above the bedrock is not thick enough to adequately filter the effluent. Effluent that seeps into cracks in the underlying rock can pollute ground water. Installing the absorption field in a mound of suitable fill material improves the filtering capacity. The included areas of deep, well drained soils are better sites for septic tank absorption fields. Installing the distribution lines across the slope helps to prevent the downslope seepage of effluent.

The potential for ponds is very low in areas of this soil because of the limited depth to bedrock.

This soil is recognized as farmland of local importance. The land capability classification is IIIe. The pasture and hayland suitability group is F-1. The woodland ordination symbol is 4A.

GeD2—Gilpin-Upshur complex, 15 to 25 percent slopes, eroded. These moderately steep, well drained soils are on dissected hillsides and benches. Erosion has removed part of the original surface layer, and the present surface layer is a mixture of material from the original surface layer and the subsoil. The Gilpin soil is on the steeper parts of hillsides, and the Upshur soil is in the less sloping areas and on benches. Landslips are common on the Upshur soil. Most areas of these soils are oblong and are 5 to 50 acres in size. They are about 40 percent Gilpin soil and 35 percent Upshur soil. The two soils occur as areas so closely intermingled that it is impractical to map them separately.

The Gilpin soil is moderately deep. Typically, the surface layer is dark grayish brown and yellowish brown, friable silt loam about 4 inches thick. The subsoil is yellowish brown, friable silt loam about 26 inches thick. Olive, fractured siltstone bedrock is at a depth of about 30 inches. Many areas are severely eroded and have a surface layer of channery silt loam.

The Upshur soil is deep. Typically, the surface layer is reddish brown, firm silty clay loam about 5 inches thick. The subsoil is reddish brown and dark reddish brown, firm silty clay and shaly silty clay about 37 inches thick. The underlying material to a depth of 60 inches or more is dark reddish brown, firm shaly silty clay loam. Some areas are underlain by thinly bedded limestone. Many areas are severely eroded and have a surface layer of silty clay.

Included with these soils in mapping are areas of Berks and Lowell soils. Berks soils are on the steeper slopes. They are stonier than the Gilpin and Upshur soils. Lowell soils are on the wider benches. They are yellower than the Gilpin and Upshur soils. Also included are moderately deep, clayey soils. Included soils make up about 25 percent of most delineations.

Permeability is moderate in the Gilpin soil and slow in the Upshur soil. Runoff is rapid on the Gilpin soil and very rapid on the Upshur soil. Available water capacity is low in the Gilpin soil and moderate in the Upshur soil. The content of organic matter is moderately low in the surface layer of both soils. The root zone is restricted by the moderate depth to bedrock in the Gilpin soil. The root zone of the Upshur soil is deep. The capacity to store and release plant nutrients is high in the Upshur soil and moderate in the Gilpin soil. The shrink-swell potential is high in the subsoil of the Upshur soil.

Most areas are used as oil fields or as woodland. Some areas have been cleared prior to strip mining for coal.

These soils are poorly suited to cultivated crops. Many areas are eroded, and controlling further erosion is the main management concern. The hazard of erosion is very severe in cultivated areas. Conserving moisture is a management concern on the Gilpin soil. Maintaining a permanent plant cover is the best means of controlling erosion. If the soil is cultivated, surface crusting after rains reduces the rate of water infiltration and retards the emergence of seedlings. Tilth is poor in eroded areas of the Upshur soil. Using a system of conservation tillage, such as no-till farming, that leaves crop residue on the surface, including grasses and legumes in the cropping system, planting cover crops, tilling on the contour, stripcropping, and establishing grassed waterways can reduce the hazard of erosion. Limiting fieldwork when the surface layer and subsoil are too wet helps to minimize compaction.

These soils are only moderately suited to hay and pasture. The roots of some species are restricted by bedrock in the Gilpin soil and by the clayey subsoil in the Upshur soil. The Gilpin soil warms up early in the spring and is well suited to early season pasture, but the Upshur soil remains soft and sticky until late spring. Forage production is reduced by droughtiness in summer, especially on the Gilpin soil. If the soils are plowed, the hazard of erosion is severe. Seeding companion crops, adding mulch, or using no-till seeding methods can reduce the hazard of erosion.

These soils are only moderately suited to timber production. The aspect of the slope affects the planting and growth of trees. Coves and north- and east-facing slopes are the best woodland sites. They have cooler temperatures and more available water than other sites because they are less exposed to the sun and prevailing winds. The Upshur soil cannot support heavy equipment because it has low strength and is slippery when wet. Spreading aggregate on haul roads or log landings helps to stabilize the surface. The slope limits the use of planting and logging equipment. Establishing roads and skid trails on the contour helps to control erosion. Establishing water bars and maintaining a vegetative cover also help to control erosion. Where roads and trails cross channels, adding stones helps to prevent gullying. Using planting techniques that spread the roots of seedlings and that increase soil-root contact reduces the seedling mortality rate on the Upshur soil. Using seedlings that have been transplanted once or adding mulch reduces the seedling mortality rate on south-facing slopes. The hazard of windthrow on the Upshur soil can be minimized by using harvesting methods that do not leave the remaining trees isolated or widely spaced.

These soils are poorly suited to use as sites for buildings because of the slope and because of the hazard of slippage and the high shrink-swell potential in areas of the Upshur soil. The Gilpin soil is better suited than the Upshur soil to building site development. In most areas the upper layers of bedrock in the Gilpin soil can be excavated. In areas of the Upshur soil, reinforcing building walls with concrete, supporting the walls with a large spread footing, and backfilling around foundations with granular material that has a low shrink-swell potential help to prevent the damage caused by shrinking and swelling. The damage caused by landslides can be prevented by building in areas of the more stable Gilpin soil. The Upshur soil is less likely to slide if saturated layers are drained. Tree roots help to stabilize the soil. Cutting and filling increase the hazard of landslides.

These soils are generally unsuited to septic tank absorption fields. The slope, the limited depth to bedrock in the Gilpin soil, and the slow permeability and the hazard of slippage in areas of the Upshur soil are severe management concerns.

Ponds can be developed in areas on benches where drainageways cross the Upshur soil. Areas of the Gilpin soil should not be selected as sites for ponds. If the Upshur soil is to be packed into fill, the soil material should be at the correct moisture content.

The land capability classification is IVe. The pasture and hayland suitability group is F-1 for the Gilpin soil and F-5 for the Upshur soil. The woodland ordination symbol is 4R on both north and south aspects for the Gilpin soil. It is 4R on north aspects and 3R on south aspects for the Upshur soil.

GeE2—Gilpin-Upshur complex, 25 to 40 percent slopes, eroded. These steep, well drained soils are on dissected hillsides and benches. The Gilpin soil is on the steeper parts of benches, and the Upshur soil is on the less sloping parts. Landslides and gullies are common. A few springs are in areas of these soils. Erosion has removed part of the original surface layer, and the present surface layer is a mixture of subsoil material and material from the original surface layer. Most areas are oblong and range from about 20 to 150 acres in size. They are about 40 percent Gilpin soil and 35 percent Upshur soil. The two soils occur as areas so intricately mixed that mapping them separately is not practical.

The Gilpin soil is moderately deep. Typically, the surface layer is dark grayish brown, friable silt loam about 4 inches thick. The subsoil is brown, friable channery silt loam about 24 inches thick. Olive shale bedrock is at a depth of about 28 inches. Many areas are severely eroded and have a surface layer of channery silt loam.

The Upshur soil is deep. Typically, the surface layer is dark reddish brown, firm silty clay loam about 5 inches thick. The subsoil is about 40 inches thick. The upper part is reddish brown and red, firm silty clay, and the lower part is reddish brown and red, firm channery silty clay. The underlying material is variegated light yellowish brown and reddish brown, firm very channery silty clay. Soft shale bedrock is at a depth of about 62 inches. Some areas are underlain by thinly bedded limestone. Many areas are severely eroded and have a surface layer of silty clay. In many places the subsoil is brown silty clay.

Included with these soils in mapping are areas of Berks soils on the steeper slopes. Also included are moderately deep soils in which the subsoil has more clay than that of the Gilpin soil and is not as red as that of the Upshur soil. Included soils make up about 25 percent of most delineations.

Permeability is moderate in the Gilpin soil and slow in the Upshur soil. Runoff is very rapid on both soils. Available water capacity is low in the Gilpin soil and moderate in the Upshur soil. The content of organic matter is moderately low in the surface layer of both soils. The root zone is moderately deep in the Gilpin soil and is deep in the Upshur soil. The shrink-swell potential is high in the subsoil of the Upshur soil.

Most areas are used as oil fields or as woodland. Some areas have been cleared prior to strip mining for coal.

These soils are unsuited to cultivated crops and hay because of the slope and a very severe hazard of erosion. Maintaining a permanent plant cover is the best means of controlling erosion.

These soils are poorly suited to pasture. The slope limits the use of equipment needed to seed and fertilize pastures. The roots of some forage plants are restricted by the bedrock in the Gilpin soil and by the clayey subsoil in the Upshur soil. The Gilpin soil warms up early in spring and is well suited to early season pasture, but the Upshur soil remains soft until late spring. Droughtiness in summer reduces forage production on the Gilpin soil. Seeding companion crops, adding mulch, or using no-till seeding methods can reduce the hazard of erosion. Erosion can be severe in pastures unless a dense sod is maintained.

These soils are only moderately suited to timber production. The aspect of the slope affects the planting and growth of trees. Coves and north- and east-facing slopes are the best woodland sites. They have cooler temperatures and more available water than other sites because they are less exposed to the sun and prevailing winds. The Upshur soil cannot support heavy equipment because it has low strength and is slippery when wet. Spreading aggregate on haul roads or log landings helps to stabilize the surface. The slope limits the use of planting and logging equipment. Establishing roads and skid trails on the contour helps to control erosion. Establishing water bars and maintaining a vegetative cover also help to control erosion. Where roads and trails cross channels, adding stones helps to prevent gullying. Using planting techniques that spread the roots of seedlings and increase soil-root contact reduces the seedling mortality rate on the Upshur soil. Using seedlings that have been transplanted once or adding mulch also reduces the seedling mortality rate, especially on south-facing slopes. The hazard of windthrow in areas of the Upshur soil can be minimized by using harvesting methods that do not leave the remaining trees isolated or widely spaced.

These soils are generally unsuited to use as sites for buildings or for septic tank absorption fields because of the slope, the limited depth to bedrock in the Gilpin soil, and the high shrink-swell potential, the restricted permeability, and the hazard of slippage in areas of the Upshur soil.

Careful onsite investigation is needed to determine the suitability of these soils as pond sites. Beds of porous siltstone alternate with beds of clay shale in areas of this map unit. Most draws have a steep gradient, and a high fill is needed to create a water impoundment of any size.

The land capability classification is VIe. The pasture and hayland suitability group is F-2 for the Gilpin soil and F-6 for the Upshur soil. The woodland ordination symbol is 4R on north and south aspects for the Gilpin soil. It is 4R on north aspects and 3R on south aspects for the Upshur soil.

GfA—Glenford silt loam, 0 to 2 percent slopes. This deep, nearly level, moderately well drained soil is on terraces in the valleys of former glacial lakes. Most areas of this soil are elongated strips or are irregular in shape and are 10 to 50 acres in size.

Typically, the surface layer is brown, friable silt loam about 10 inches thick. The subsoil is about 40 inches thick. The upper part is yellowish brown, friable silt loam; the next part is dark yellowish brown, mottled, firm silt loam; and the lower part is yellowish brown, mottled, firm silty clay loam. The underlying material to a depth of 60 inches or more is brown, firm silty clay loam.

Included with this soil in mapping are small areas of Fitchville, McGary, Sebring, and Luray soils. The somewhat poorly drained Fitchville and McGary soils are on flats. The poorly drained or very poorly drained Sebring and Luray soils are in slight depressions. Also included are areas in the flood pools of the Dillon Lake dam and the Wills Creek dam that are subject to controlled flooding. Included areas make up about 15 percent of most delineations.

Permeability is moderately slow in the Glenford soil. Runoff is slow. Available water capacity is high. The content of organic matter is moderately low in the surface layer. The shrink-swell potential is moderate, and the potential for frost action is high. The capacity to store and release plant nutrients is moderate. A seasonal high water table is perched in the lower part of the subsoil in winter and spring and during other extended wet periods.

Most areas are used as cropland. Some areas are used for hay or pasture in rotation with crops. Only a few areas are wooded.

This soil is well suited to cultivated crops, including specialty crops. The hazard of erosion is slight in cultivated areas. If the soil is cultivated, surface crusting after rains reduces the rate of water infiltration and retards the emergence of seedlings. Using a system of conservation tillage, such as no-till farming, that leaves crop residue on the surface, including grasses and legumes in the cropping system, and planting cover crops increase the content of organic matter and improve tilth. Limiting fieldwork when the surface layer and subsoil are too wet helps to minimize compaction. Subsurface drains can reduce wetness in scattered areas of the included Fitchville soils.

This soil is well suited to hay and pasture. Most of the commonly grown forage plants thrive on this soil. Acidity in the root zone is a limitation that affects some legumes. Frost heave can damage deep-rooted legumes, especially in pure stands. Leaving a protective cover on the surface in the fall and seeding a grass-legume mixture can reduce the damage caused by frost heave.

This soil is well suited to timber production. No major limitations affect the planting or growth of trees. The soil has low strength when wet and cannot support heavy equipment. Spreading aggregate on haul roads or log landings helps to stabilize the surface. Plant competition can be controlled by removing vines and the less desirable trees and shrubs.

This soil is only moderately suited to use as a site for buildings or for septic tank absorption fields. The seasonal wetness and the moderate shrink-swell potential are limitations on sites for buildings. Drains are commonly installed at the base of footings to remove excess water. Landscaping and using diversions help to keep surface water away from foundations. The stability of foundations is a concern in inadequately drained areas because the soil has low strength when wet. Backfilling around foundations with material that has a low shrink-swell potential helps to prevent the structural damage caused by shrinking and swelling. The restricted permeability and the seasonal wetness are limitations on sites for septic tank absorption fields. Enlarging the absorption field or installing a double field that can be alternately dosed helps to overcome the restricted permeability. Perimeter drains can lower the seasonal high water table.

Excavated ponds are likely to have an excessive seepage rate.

The land capability classification is I. The pasture and hayland suitability group is A-6. The woodland ordination symbol is 5A.

GfB—Glenford silt loam, 2 to 6 percent slopes. This deep, gently sloping, moderately well drained soil is on terraces in the valleys of former glacial lakes. Most areas are on smooth and convex shoulder slopes or low knolls. They are round or long and narrow and range from 5 to 100 acres in size.

Typically, the surface layer is dark grayish brown, friable silt loam about 7 inches thick. The subsoil is about 33 inches thick. The upper part is brown, friable silt loam; the next part is yellowish brown, mottled, friable silt loam; and the lower part is brown, mottled, firm silty clay loam. The underlying material to a depth of 60 inches or more is brown, mottled, firm silty clay loam. Some areas on the higher knolls are well drained. Areas near the margin of uplands have a loamy subsoil.

Included with this soil in mapping are small areas of Fitchville, Omulga, and Markland soils. The somewhat poorly drained Fitchville soils are in depressions. Omulga soils have a fragipan. Markland soils have a surface layer of silty clay loam. They are more clayey than the Glenford soil. Also included are areas in the flood pools of the Dillon Lake dam and the Wills Creek dam that are subject to controlled flooding. Included areas make up about 20 percent of most delineations.

Permeability is moderately slow in the Glenford soil. Runoff is medium. Available water capacity is high. The content of organic matter is moderately low in the surface layer. Tilth is good, and the root zone is deep. The capacity to store and release plant nutrients is moderate. A seasonal high water table is perched in the lower part of the subsoil in late winter and in spring and during other extended wet periods.

Most areas are used for row crops, hay, or pasture. Some areas are wooded.

This soil is well suited to cultivated crops, including specialty crops. The hazard of erosion is moderate in cultivated areas. If the soil is cultivated, surface crusting after rains reduces the rate of water infiltration and retards the emergence of seedlings. Using a system of conservation tillage, such as no-till farming, that leaves crop residue on the surface, including grasses and legumes in the cropping system, planting cover crops, and tilling on the contour can reduce the hazard of erosion. Limiting fieldwork when the surface layer and subsoil are too wet helps to minimize compaction. Subsurface drains can reduce wetness in included areas of the wetter Fitchville soils.

This soil is well suited to hay and pasture. It is suited to most of the commonly grown forage plants. Acidity in the root zone is a limitation that affects some legumes. Frost heave can damage deep-rooted legumes, especially in pure stands. Leaving a protective cover of vegetation on the surface in the fall and including grasses in the seeding mixture can reduce the damage caused by frost heave. If the soil is plowed, the hazard of erosion is moderate. Seeding companion crops, adding mulch, or using no-till seeding methods can reduce the hazard of erosion.

This soil is well suited to timber production. No major limitations affect the planting or growth of trees. The soil has low strength when wet and cannot support heavy equipment. Spreading aggregate on haul roads or log landings helps to stabilize the surface. Plant competition can be controlled by removing vines and the less desirable trees and shrubs.

This soil is only moderately suited to use as a site for buildings. The seasonal wetness and the shrink-swell potential are limitations on sites for dwellings. Waterproofing basement walls and installing drains at the base of footings help to keep basements dry. Reinforcing walls with concrete, supporting the walls with a large spread footing, and backfilling around foundations with granular material that has a low shrink-swell potential help to prevent the damage caused by shrinking and swelling. Removing as little vegetation as possible, mulching, and establishing a temporary plant cover help to control erosion on construction sites.

This soil is only moderately suited to use as a site for septic tank absorption fields. The seasonal wetness and the restricted permeability are limitations. Perimeter drains can reduce the wetness. Enlarging the absorption area or installing a double absorption field system helps to overcome the restricted permeability.

Excavated ponds are likely to have an excessive seepage rate. The soil does not pack well and is a poor source of material for earthen dams.

The land capability classification is IIe. The pasture and hayland suitability group is A-6. The woodland ordination symbol is 5A.

GfC2—Glenford silt loam, 6 to 15 percent slopes, eroded. This deep, strongly sloping, moderately well drained soil is on dissected terraces in the valleys of former glacial lakes. Most areas are on shoulder slopes at the margin of the dissected terraces, but some areas are on the foot slopes of upland hillsides. Sheet and rill erosion has removed part of the original surface layer, and cultivation has mixed subsoil material into the present surface layer. Most areas are long strips that range from 5 to 100 acres in size.

Typically, the surface layer is dark grayish brown and yellowish brown, friable silt loam about 6 inches thick. The subsoil is about 34 inches thick. The upper part is brown, friable silt loam, and the lower part is yellowish brown, mottled, firm silty clay loam. The underlying material to a depth of 60 inches or more is yellowish brown, mottled, firm silty clay loam. In severely eroded areas the surface layer is silty clay loam. In areas where the underlying material is sandy loam, the soil is well drained.

Included with this soil in mapping are small areas of Coshocton and Clarksburg soils. Coshocton soils are at the edge of upland hillsides. They have a higher content of sand and coarse fragments in the subsoil and underlying material than the Glenford soil. Clarksburg soils are on the lower part of foot slopes. They have a fragipan. Also, they have a higher content of coarse fragments in the surface layer and subsoil than the Glenford soil. Also included are areas in the flood pools of the Dillon Lake dam and the Wills Creek dam that are subject to controlled flooding. Included areas make up about 20 percent of most delineations.

Permeability is moderately slow in the Glenford soil. Runoff is medium or rapid. Available water capacity is high. The content of organic matter is moderately low in the surface layer. The root zone is deep. The capacity to store and release plant nutrients is moderate. The potential for frost action is high. The shrink-swell potential is moderate in the upper part of the subsoil. A seasonal high water table is perched in the lower part of the subsoil during extended wet periods.

Most areas are used for cultivated crops or pasture. Some areas are wooded.

This soil is only moderately suited to cultivated crops. The hazard of erosion is severe in cultivated areas. Improving soil fertility and conserving moisture are management concerns. If the soil is cultivated, surface crusting after rains reduces the rate of water infiltration and retards the emergence of seedlings. Using a system of conservation tillage, such as no-till farming, that leaves crop residue on the surface, including grasses and legumes in the cropping system, planting cover crops, tilling on the contour, stripcropping, and establishing grassed waterways can reduce the hazard of erosion. Limiting fieldwork when the surface layer and subsoil are too wet helps to minimize compaction. Subsurface drains are needed in scattered seepy areas.

This soil is well suited to hay and pasture. It is suited to most of the commonly grown forage plants. Acidity in the root zone is a limitation that affects some legumes. Frost heave can damage deep-rooted legumes, especially in pure stands. Leaving a protective cover on the surface in the fall and seeding a mixture of grasses and legumes can minimize the damage caused by frost heave. If the soil is plowed or finely worked, the hazard of erosion is severe. Seeding companion crops, adding mulch, or using no-till seeding methods can reduce the hazard of erosion.

This soil is well suited to timber production. No major limitations affect the planting or growth of trees. The soil has low strength when wet and cannot support heavy equipment. Spreading aggregate on haul roads or log landings helps to stabilize the surface. Plant competition can be controlled by removing vines and the less desirable trees and shrubs.

This soil is only moderately suited to use as a site for buildings. The seasonal wetness and the shrink-swell potential are limitations on sites for dwellings. Removing as little vegetation as possible, adding mulch, and establishing a temporary plant cover help to prevent erosion on construction sites. Waterproofing basement walls and installing drains at the base of footings help to keep basements dry. Reinforcing walls with concrete, supporting the walls with a large spread footing, and backfilling around foundations with granular material that has a low shrink-swell potential help to prevent the damage caused by shrinking and swelling.

This soil is only moderately suited to use as a site for septic tank absorption fields. The seasonal wetness, the restricted permeability, and the slope are management concerns. Installing the leach lines on the contour helps to prevent the surfacing of effluent. Perimeter drains can reduce the wetness by lowering the water table. Enlarging the field or installing a double absorption field helps to overcome the restricted permeability.

This soil does not pack well and is poor material for earthen dams. There is some potential for ponds in draws that cross areas of this soil, but careful onsite investigation is needed.

This soil is recognized as farmland of local importance. The land capability classification is IIIe. The pasture and hayland suitability group is A-6. The woodland ordination symbol is 5A.

GtC2—Guernsey-Upshur silty clay loams, 6 to 15 percent slopes, eroded. These deep, strongly sloping soils are on benches below the steeper hillsides and on isolated knolls on the broader ridgetops. They formed in material weathered from alternating thin beds of brown, gray, and red clay shale. Most areas are dissected by drainageways. Erosion has removed part of the surface layer, and tillage has incorporated part of the subsoil into the remaining surface layer. Many areas have an irregular or hummocky surface because of scars, gullies, and landslides. Most areas are long and narrow or are circular and are 5 to 75 acres in size. They are about 50 percent Guernsey soil and 30 percent Upshur soil. The two soils occur as areas so narrow and intermingled that it is impractical to map them separately.

The Guernsey soil is moderately well drained. Typically, the surface layer is brown, friable silty clay loam about 7 inches thick. The subsoil is about 32 inches thick. The upper part is light olive brown and brown, mottled, firm silty clay. The lower part is brown, firm channery silty clay and mixed weak red and olive gray, firm channery clay. The underlying material to a depth of about 62 inches is mixed light olive brown and light olive gray, very firm channery silty clay. Below this is soft clay shale bedrock. In severely eroded areas the surface layer is silty clay. In places the soil is well drained.

The Upshur soil is well drained. Typically, the surface layer is dark brown, firm silty clay loam about 4 inches thick. The subsoil is about 36 inches thick. The upper part is yellowish red, firm silty clay, and the lower part is dark reddish brown, firm silty clay and dark red, firm silty clay loam. The underlying material to a depth of 74 inches or more is yellowish brown and dark reddish brown, calcareous, firm silty clay loam and silty clay. In some areas the soil is reddish brown and is moderately well drained or has a surface layer of silt loam and a red, clayey subsoil.

Included with these soils in mapping are small areas of Claysville, Westgate, and Zanesville soils. The somewhat poorly drained Claysville soils are near seepy areas. Westgate and Zanesville soils are in the less sloping areas. They contain less clay in the upper part of the subsoil than the Guernsey and Upshur soils. Zanesville soils have a fragipan. Included soils make up about 20 percent of most delineations.

Permeability is moderately slow or slow in the Guernsey soil and slow in the Upshur soil. Runoff is rapid on both soils. Available water capacity is moderate. The content of organic matter in the surface layer is moderately low. The root zone is deep, but the clayey subsoil restricts the root development of some species. Tilth is only fair because of the high content of clay and the moderately low content of organic matter. The shrink-swell potential is high in the subsoil. The potential for frost action is moderate. A seasonal high water table is in the lower part of the subsoil of the

Guernsey soil during extended wet periods. The water table generally is below a depth of 60 inches in areas of the Upshur soil.

Most areas are used for pasture or hay. Some areas are used as oil fields or as woodland.

These soils are poorly suited to cultivated crops. Erosion is the major management concern. The hazard of erosion is severe in cultivated areas. Using a system of conservation tillage that leaves crop residue on the surface, establishing grassed waterways, stripcropping on the contour, and planting cover crops improve tilth, reduce the runoff rate, and help to prevent excessive erosion. Natural drainage generally is adequate, but subsurface drains are needed in scattered seepy areas. Tilling when the soils are wet causes compaction of the surface layer and cloddiness. The hummocky surface interferes with the use of equipment in some areas.

These soils are well suited to hay and pasture but are poorly suited to alfalfa. A wide variety of forage plants can grow on the Guernsey soil, but the clayey subsoil of the Upshur soil restricts the roots of some species. Frost heave in areas of the Guernsey soil can damage deep-rooted legumes, especially in pure stands. Leaving a protective cover on the surface in the fall or including grasses in the seeding mixture can minimize the damage caused by frost heave. If the soil is plowed, the hazard of erosion is moderate. Seeding companion crops, adding mulch, or using no-till seeding methods can reduce the hazard of erosion.

These soils are only moderately suited to timber production. The clayey subsoil affects the planting and growth of trees in areas of the Upshur soil. Both soils cannot support heavy equipment because they have low strength and are slippery when wet. Spreading aggregate on haul roads or log landings helps to stabilize the surface. Using planting techniques that spread the roots of seedlings and that increase soil-root contact can reduce the seedling mortality rate. Plant competition can be controlled by removing vines and the less desirable trees and shrubs. The hazard of windthrow on the Upshur soil can be reduced by using harvesting methods that do not leave the remaining trees isolated or widely spaced.

These soils are poorly suited to use as sites for buildings because of the high shrink-swell potential and the hazard of slippage. Also, seasonal wetness is a limitation in areas of the Guernsey soil. Coating basement walls and installing drains at the base of footings help to keep basements dry. Reinforcing walls with concrete, supporting the walls with a large spread footing, and sloping trench walls before backfilling around foundations with granular material that has a low shrink-swell potential help to prevent the damage caused by shrinking and swelling. Cutting and filling increase the hazard of hillside slippage, but installing a drainage system in seepy areas reduces this hazard. Removing as little vegetation as possible, adding mulch, and establishing a temporary plant cover reduce the hazard of erosion on construction sites.

These soils are poorly suited to conventional septic tank absorption fields. The seasonal wetness and the restricted permeability are limitations. Installing the leach lines on the contour helps to prevent the surfacing of effluent. Perimeter drains can reduce the seasonal wetness. Installing the leach lines in permeable fill material can improve the filtering capacity of the soils. An aerator or an alternative system should be considered.

These soils have good potential as pond sites. The soil material packs well only if used at the proper moisture content. Onsite investigation is needed to detect layers of porous or shattered rock that would permit excessive seepage.

The land capability classification is IVe. The pasture and hayland suitability group is A-6 for the Guernsey soil and F-5 for the Upshur soil. The woodland ordination symbol is 4A for the Guernsey soil and 3C for the Upshur soil.

GtD2—Guernsey-Upshur silty clay loams, 15 to 25 percent slopes, eroded. These deep, moderately steep soils are in coves or on dissected benches on hillsides. Erosion has removed part of the surface layer, and tillage has incorporated part of the subsoil into the remaining surface layer. Most areas of these soils are long and narrow or are circular and range from 5 to 75 acres in size. They are crossed by many drainageways. They are about 45 percent Guernsey soil and 30 percent Upshur soil. The two soils occur as areas so closely intermingled that it is impractical to map them separately.

The Guernsey soil is moderately well drained. Typically, the surface layer is brown, friable silty clay loam about 7 inches thick. The subsoil is about 32 inches thick. The upper part is light olive brown and brown, mottled, firm silty clay and clay. The lower part is weak red and olive gray, firm clay. The underlying material is light olive brown and light olive gray, very firm silty clay about 23 inches thick. In places the surface layer is silty clay and is composed mostly of subsoil material. Some areas are somewhat poorly drained, and other areas are well drained.

The Upshur soil is well drained. Typically, the surface layer is dark brown silty clay loam about 4 inches thick. The subsoil is firm clay about 36 inches thick. The upper part is yellowish red, and the lower part is dark reddish brown and dark red. The underlying material is yellowish brown and dark reddish brown, very firm, calcareous clay and silty clay loam about 34 inches thick.

Included with these soils in mapping are small areas of Claysville, Westgate, and Berks soils. The somewhat poorly drained Claysville soils are in seepy areas. Westgate soils are on the less sloping benches. They have a thicker silty surface layer than that of the Guernsey and Upshur soils. The moderately deep Berks soils are on the steeper slopes. Also included are moderately well drained areas of reddish brown soils. Included areas make up about 25 percent of most delineations.

Permeability is slow or moderately slow in the Guernsey soil and slow in the Upshur soil. Runoff is rapid on both soils. Available water capacity is moderate. The content of organic matter is moderately low in the surface layer, and tilth is fair. The root zone is deep, but the clayey subsoil restricts the root development of some species. A seasonal high water table is perched in the lower part of the subsoil of the Guernsey soil in late winter and in spring and during other extended wet periods. The water table is generally below a depth of 60 inches in the Upshur soil. The shrink-swell potential is high in the lower parts of the subsoil of both soils. The potential for frost action is moderate.

Most areas are used as pasture or as wooded pasture. Some areas are used as oil fields or woodland.

These soils are generally unsuited to cultivation because of the slope, landslides, gullies, and a very severe hazard of erosion. Maintaining a permanent plant cover is the best means of controlling erosion.

These soils are only moderately suited to hay and pasture. They are poorly suited to deep-rooted legumes, such as alfalfa, because of frost heave and seasonal wetness in areas of the Guernsey soil and the restricted root zone in areas of the Upshur soil. If the soils are plowed, the hazard of erosion is severe. Seeding companion crops, adding mulch, or using no-till seeding methods can reduce the hazard of erosion. In some areas the gullied or hummocky surface interferes with seeding and the improvement of forage stands.

These soils are only moderately suited to timber production. The aspect of the slope affects the planting and growth of trees. Coves and north- and east-facing slopes are the best woodland sites. They have cooler temperatures and more available water than other sites because they are less exposed to the sun and prevailing winds. The soils cannot support heavy equipment because they have low strength and are slippery when wet. Spreading aggregate on haul roads or log landings helps to stabilize the surface. The slope limits the use of planting and logging equipment. Establishing roads and skid trails on the contour helps to control erosion. Establishing water bars and maintaining a vegetative cover also help to control erosion. Where roads and trails cross channels, adding stones helps to prevent gullying. Using planting techniques that spread the roots of seedlings and increase soil-root contact reduces the seedling mortality rate. Using seedlings that have been transplanted once or adding mulch also reduces the seedling mortality rate. Plant competition can be controlled by removing vines and the less desirable trees and shrubs. The hazard of windthrow on the Upshur soil can be reduced by using harvesting techniques that do not leave the remaining trees isolated or widely spaced.

These soils are generally unsuited to use as sites for buildings or for septic tank absorption fields. The slope, the seasonal wetness, the high shrink-swell potential, the restricted permeability, and the hazard of slippage are severe limitations. These limitations are difficult and costly to overcome.

There are some pond sites in areas of these soils. The soil material packs well if used at the right moisture content. Onsite investigation is needed to detect porous or shattered rock layers that would permit excessive seepage.

The land capability classification is VIe. The pasture and hayland suitability group is A-6 for the Guernsey soil and F-5 for the Upshur soil. The woodland ordination symbol is 4R on both north and south aspects for the Guernsey soil. It is 4R on north aspects and 3R on south aspects for the Upshur soil.

HaC2—Homewood silt loam, 8 to 15 percent slopes, eroded. This deep, strongly sloping, moderately well drained soil is on shoulder slopes and dissected glaciated ridgetops. Erosion has removed part of the original surface layer, and tillage has incorporated clay, coarse fragments, and other subsoil material into the remaining surface layer. Most areas range from 5 to 40 acres in size.

Typically, the surface layer is dark brown, friable silt loam about 7 inches thick. The subsoil is about 73 inches thick. The upper part is yellowish brown, firm silty clay loam and clay loam. The next part is a fragipan of yellowish brown and brown, very firm and brittle clay loam. The lower part of the subsoil is yellowish brown, firm clay loam. Some areas are severely eroded and have a surface layer of gravelly clay loam. In some small areas the soil is less sloping and has a mantle of silt as much as 30 inches thick.

Included with this soil in mapping are areas of Coshocton soils. These soils are on foot slopes and benches at the margin of glaciated areas. They make up about 20 percent of most delineations.

Permeability is moderate in the upper part of the

Homewood soil and slow in the fragipan. Runoff is rapid in cultivated areas. The root zone is moderately deep. Available water capacity is low above the fragipan. The content of organic matter in the surface layer is moderately low because of the loss of the original surface soil. A high water table is perched above the fragipan in late winter and in spring and during other extended wet periods. The capacity to store and release plant nutrients and the potential for frost action are moderate.

Many areas are used as cropland. Some areas are used as pasture or woodland.

This soil is only moderately suited to cultivated crops. Many areas are significantly eroded, and controlling further erosion is the main management concern. The hazard of erosion is severe in cultivated areas. Improving soil fertility and conserving moisture also are management concerns. If the soil is cultivated, surface crusting after rains reduces the rate of water infiltration and retards the emergence of seedlings. Using a system of conservation tillage, such as no-till farming, that leaves crop residue on the surface, including grasses and legumes in the cropping system, planting cover crops, tilling on the contour, and establishing grassed waterways can reduce the hazard of erosion. Limiting fieldwork when the surface layer and subsoil are too wet helps to minimize compaction. Using subsurface drains in seepy areas increases crop production in most years.

This soil is well suited to hay and pasture. The roots of some species are restricted by the fragipan. Frost heave can damage deep-rooted legumes, especially in pure stands. Leaving a protective cover on the surface in the fall or seeding a grass-legume mixture can minimize the damage caused by frost heave. If the soil is plowed, the hazard of erosion is moderate. Seeding companion crops, adding mulch, or using no-till seeding methods can reduce the hazard of erosion.

This soil is well suited to timber production. No major limitations affect the planting or growth of trees. The soil has low strength when wet and cannot support heavy equipment. Spreading aggregate on haul roads or log landings helps to stabilize the surface.

This soil is well suited to use as a site for buildings. The slope, the shrink-swell potential, and the seasonal wetness are the main management concerns. Increased runoff and erosion are management concerns on construction sites in sloping areas. Designing buildings so that they conform to the natural slope of the land and maintaining a vegetative cover help to control runoff and erosion. Drains around footings can lower the water table. Backfilling the drains with granular material helps to intercept water seeping along the top of the fragipan. Installing reinforced foundation footings and walls and backfilling with granular material that has a low shrink-swell potential help to prevent the damage caused by shrinking and swelling.

This soil is poorly suited to use as a site for septic tank absorption fields. The restricted permeability in the lower part of the subsoil and the seasonal high water table are limitations. Using perimeter drains around absorption fields can lower the water table and intercept lateral seepage from the higher areas. Enlarging the absorption field increases the capacity of the soil to filter the effluent. Installing distribution lines on the contour helps to prevent the surfacing of effluent.

There is good potential for ponds along drainageways in areas of this soil. The soil material packs well and makes good fill. Excavating into rock layers should be avoided. Onsite investigation is needed to determine the depth to bedrock.

This soil is recognized as farmland of local importance. The land capability classification is IIIe. The pasture and hayland suitability group is F-3. The woodland ordination symbol is 5D.

HaD2—Homewood silt loam, 15 to 20 percent slopes, eroded. This moderately deep, steep, moderately well drained soil is on glaciated hillsides that are dissected. Erosion has removed much of the original surface layer. Most areas are irregular in shape and range from 5 to 30 acres in size.

Typically, the surface layer is brown, friable silt loam about 7 inches thick. The subsoil is about 58 inches thick. The upper part is strong brown and yellowish brown, firm silty clay loam and yellowish brown, firm clay loam. The next part is a fragipan of yellowish brown, mottled, very firm and firm gravelly clay loam about 18 inches thick. The lower part of the subsoil is yellowish brown, mottled, firm clay loam. The underlying material to a depth of 80 inches or more is brown, firm clay loam. In a few severely eroded areas, the surface layer is gravelly clay loam. In some places the subsoil does not have a layer of very firm gravelly clay loam.

Included with this soil in mapping are small areas of Gilpin, Berks, Coshocton, and Westmoreland soils. The moderately deep Gilpin and Berks soils are in the steeper areas. They have bedrock within a depth of 40 inches. Coshocton and Westmoreland soils formed in colluvium or residuum on foot slopes and benches. Also included are somewhat poorly drained soils in drainageways and seep zones. Included soils make up about 20 percent of most delineations.

Permeability is moderate in the upper part of the Homewood soil and slow in the fragipan. Runoff is very rapid. The root zone is restricted by the dense fragipan. Available water capacity is low above the fragipan. Because of past erosion, the content of organic matter in the surface layer is low. The capacity to store and release plant nutrients is moderate. A high water table is perched above the fragipan during wet periods.

Most areas are used for pasture or hay. Some areas are used as wooded pasture.

This soil is poorly suited to cultivated crops. Erosion is the main management concern, and the hazard of erosion is very severe in cultivated areas. Fertility and droughtiness also are management concerns. Using a system of conservation tillage, such as no-till farming, that leaves crop residue on the surface, including grasses and legumes in the cropping system, planting cover crops, tilling on the contour, and establishing grassed waterways can reduce the hazard of erosion. Maintaining a permanent plant cover is the best means of controlling erosion. If the soil is cultivated, surface crusting after rains reduces the rate of water infiltration and hinders the emergence of seedlings. Limiting fieldwork when the surface layer and subsoil are too wet helps to minimize compaction. Using subsurface drains in seepy areas increases crop production in most years.

This soil is only moderately suited to hay and pasture. The roots of some forage plants are restricted by the fragipan. Frost heave can damage deep-rooted legumes, especially in pure stands. Leaving a protective cover on the surface in the fall or seeding a grass-legume mixture can minimize the damage caused by frost heave. If the soil is plowed, the hazard of erosion is severe. Seeding companion crops, adding mulch, or using no-till seeding methods can reduce the hazard of erosion. After a good forage stand is established, it should be maintained for as long as possible. Erosion can be severe in pastures that are overgrazed.

This soil is only moderately suited to timber production. The aspect of the slope affects the planting and growth of trees. Coves and north- and east-facing slopes are the best woodland sites. They have cooler temperatures and more available water than other sites because they are less exposed to the sun and prevailing winds. The soil has low strength when wet and cannot support heavy equipment. Spreading aggregate on haul roads or log landings helps to stabilize the surface. The slope limits the use of planting and logging equipment. Establishing roads and skid trails on the contour, establishing water bars, and maintaining a vegetative cover help to control erosion. Where roads and trails cross channels, adding stones helps to prevent gullying. Using seedlings that have been transplanted once or adding mulch can reduce the seedling mortality rate on south-facing slopes. The hazard of windthrow can be reduced by using harvesting methods that do not leave the remaining trees isolated or widely spaced.

This soil is only moderately suited to use as a site for buildings. The slope is the main management concern. Removing as little vegetation as possible, adding mulch, and establishing a temporary plant cover can reduce the hazard of erosion on construction sites. Drains around footings can lower the water table. Backfilling the drains with gravel helps to intercept water seeping along the top of the fragipan. The damage caused by shrinking and swelling can be minimized by installing reinforced foundation footings and walls and by backfilling with granular material that has a low shrink-swell potential.

This soil is generally unsuited to conventional septic tank absorption fields because of the slope, the seasonal high water table, and the restricted permeability in the fragipan.

This soil typically packs well and is good fill material for dams. Ponds that are developed in draws have a good chance of holding water. Onsite investigation is needed to determine the thickness of suitable material over bedrock.

The land capability classification is IVe. The pasture and hayland suitability group is F-3. The woodland ordination symbol is 5R.

JtA—Jimtown loam, 0 to 3 percent slopes. This deep, nearly level, somewhat poorly drained soil is on glacial outwash terraces and margins of former glacial lake valleys. Many areas receive runoff or seepage from higher landscape positions. Most areas are 5 to 20 acres in size.

Typically, the surface layer is dark grayish brown, friable loam about 8 inches thick. The subsoil is about 40 inches thick. It is mottled. The upper part is grayish brown, friable loam, and the lower part is yellowish brown, friable gravelly loam. The underlying material to a depth of 80 inches or more is yellowish brown, friable very gravelly loam and dark gray, loose very gravelly sandy loam. In many areas the underlying material is fine sandy loam and silt loam. Some areas are poorly drained.

Included with this soil in mapping are small areas of Fitchville and Chili soils. Fitchville soils are on the margin of some areas that have a thick mantle of silt. The well drained Chili soils are on convex slopes. Also included are areas in the flood pools of the Dillon Lake dam and the Wills Creek dam that are subject to controlled flooding. Included areas make up about 20 percent of most delineations.

Permeability is moderate in the Jimtown soil. Runoff is slow. Available water capacity and the content of organic matter in the surface layer are moderate. The capacity to store and release plant nutrients also is moderate. The seasonal high water table is at a depth of 12 to 30 inches in winter and in spring and during other extended wet periods. The root zone is restricted by the water table.

Most areas are used for cultivated crops or for hay and pasture.

If drained, this soil is well suited to cultivated crops. Subsurface drains can lower the seasonal high water table. Grassed waterways and open ditches can carry the runoff from adjacent upland soils to natural drainageways or to other ditches. The hazard of erosion is slight in cultivated areas. If the soil is cultivated, surface crusting after rains reduces the rate of water infiltration and hinders the emergence of seedlings. Using a system of conservation tillage, such as no-till farming, that leaves crop residue on the surface, including grasses and legumes in the cropping system, and planting cover crops increase the content of organic matter in the soil and improve tilth. Limiting fieldwork when the surface layer and subsoil are too wet helps to minimize compaction.

Drained areas of this soil are well suited to hay and pasture. Plant species that can tolerate seasonal wetness are the best suited. The number of suitable species is more limited in areas that have not been drained. Areas that have not been drained are moderately suited to bluegrass pasture. Deferring grazing during wet periods helps to prevent compaction of the surface layer and damage to plant roots.

This soil is well suited to timber production. No major limitations affect the planting or growth of trees. The soil has low strength when wet and cannot support heavy equipment. Spreading aggregate on haul roads or log landings helps to stabilize the surface. Species that can tolerate wetness should be selected for planting.

This soil is only moderately suited to use as a site for buildings. The seasonal wetness is the main limitation. Surface and subsurface drains can be used to lower the water table. Waterproofing basement walls, installing drains at the base of footings, and using sump pumps help to keep water away from basements. Safety precautions are needed to prevent the caving of cutbanks in excavated areas.

This soil is poorly suited to use as a site for septic tank absorption fields. The seasonal high water table in the upper part of the subsoil is a severe limitation. Perimeter drains can lower the water table if suitable outlets are available.

There are no natural pond sites in areas of this soil, and excavated ponds are unlikely to hold water.

In areas that have not been drained, this soil is recognized as farmland of local importance. The land capability classification is IIw. The pasture and hayland suitability group is C-1. The woodland ordination symbol is 5A.

KeB—Keene silt loam, 2 to 6 percent slopes. This deep, gently sloping, moderately well drained soil is on knolls on ridgetops and benches. Most areas are long or crescent shaped and range from 5 to 60 acres in size.

Typically, the surface layer is brown, friable silt loam about 10 inches thick. The upper part of the subsoil is dark yellowish brown, friable silt loam about 11 inches thick. The lower part is light gray and yellowish brown, mottled, firm channery silty clay loam about 34 inches thick. The underlying material is gray silty clay about 7 inches thick. It is mottled. Soft, weathered shale bedrock is at a depth of about 62 inches. In places the lower part of the subsoil has brown or reddish brown colors. In areas where the silt mantle is thin, the subsoil contains more clay. Some areas have a layer of very dark gray silty clay in the subsoil. This layer is associated with coal blossom. In a few areas the subsoil contains more rock fragments. The margins of a few areas are more sloping. Areas on Flint Ridge have common flint fragments.

Included with this soil in mapping are small areas of Zanesville, Alford, and Wellston soils. Zanesville soils have a fragipan. The well drained Alford and Wellston soils are in convex landscape positions. Also included, near seep zones and drainageways, are soils that are wetter than the Keene soil. Included soils make up about 20 percent of most delineations.

Permeability is moderate or moderately slow in the upper part of the subsoil of the Keene soil and is moderately slow or slow in the lower part. Runoff is medium. Available water capacity is high. The content of organic matter is moderate in the surface layer. The root zone is deep. The capacity to store and release plant nutrients is moderate. A seasonal high water table is perched in the lower part of the subsoil during extended wet periods.

Most areas are used as cropland. Some areas are used as pasture.

This soil is well suited to cultivated crops, including specialty crops. Erosion is the main management concern. The hazard of erosion is moderate in cultivated areas. If the soil is cultivated, surface crusting after rains reduces the rate of water infiltration and hinders the emergence of seedlings. Using a system of conservation tillage, such as no-till farming, that leaves crop residue on the surface, including grasses and legumes in the cropping system, planting cover crops, and tilling on the contour reduce the hazard of erosion. Limiting fieldwork when the surface layer and subsoil are too wet helps to minimize compaction. Subsurface drains can reduce the wetness in scattered areas.

This soil is well suited to hay and pasture. It is suited to a wide variety of forage plants. Acidity in the root zone and wetness are limitations that affect some legumes. Frost heave can damage deep-rooted legumes, especially in pure stands. Leaving a protective cover on the surface in the fall or seeding a grass-legume mixture can minimize the damage caused by frost heave. If the soil is plowed, the hazard of erosion is moderate. Seeding companion crops, adding mulch, or using no-till seeding methods can reduce the hazard of erosion.

This soil is well suited to timber production. It has low strength when wet, however, and cannot support heavy equipment. Spreading aggregate on haul roads or log landings helps to stabilize the surface. Plant competition can be controlled by removing vines and the less desirable trees and shrubs.

This soil is only moderately suited to use as a site for buildings. The seasonal wetness is a limitation, especially on sites for buildings with basements. Coating basement walls and installing perimeter drains can minimize seepage and reduce wetness. The moderate shrink-swell potential also is a limitation. Reinforcing walls, supporting the walls with a large spread footing, and backfilling around foundations with granular material that has a low shrink-swell potential can minimize the damage caused by shrinking and swelling.

This soil is only moderately suited to use as a site for septic tank absorption fields. The seasonal wetness and the restricted permeability in the lower part of the subsoil are limitations. Perimeter drains can reduce the wetness by lowering the water table. Enlarging the absorption field helps to overcome the restricted permeability.

There are few natural pond sites. Commonly, the watershed area for excavated ponds is limited. Onsite investigation is needed to identify any layers that would permit excessive seepage. The upper layers of the soil do not pack well and are poor fill.

The land capability classification is IIe. The pasture and hayland suitability group is A-6. The woodland ordination symbol is 4A.

KeC2—Keene silt loam, 6 to 15 percent slopes, eroded. This deep, strongly sloping, moderately well drained soil is on knolls and shoulder slopes on ridgetops and benches. Erosion has removed part of the original surface layer. Most areas are oblong or irregular in shape and range from 10 to 50 acres in size.

Typically, the surface layer is brown, friable silt loam about 8 inches thick. The upper part of the subsoil is yellowish brown, firm silt loam and yellowish brown, mottled, firm silty clay loam about 22 inches thick. The lower part of the subsoil, to a depth of about 58 inches, is light gray and light olive brown, mottled, very firm silty clay loam and channery silty clay loam. The underlying material is dark grayish brown, mottled, very firm clay about 16 inches thick. Soft, weathered, gray clay shale bedrock is at a depth of about 74 inches. In many places the subsoil contains more rock fragments and sand. A few areas on Flint Ridge have common flint fragments. In areas where the mantle of silt is thin, the subsoil contains more clay. A few places have a thin layer of coal blossom. In some areas the subsoil is silt loam. The margins of a few areas are moderately steep. The ridgetops in a few areas are gently sloping and are less eroded. A few areas are on foot slopes.

Included with this soil in mapping are small areas of the well drained Gilpin, Wellston, and Westmoreland soils. Gilpin soils have sandstone or siltstone bedrock within a depth of 40 inches. Wellston and Westmoreland soils are in areas where the subsoil is underlain by siltstone. Also included, near seep zones and along drainageways, are soils that are wetter than the Keene soil. Included soils make up about 20 percent of most delineations.

Permeability is moderate or moderately slow in the upper part of the subsoil of the Keene soil and is moderately slow or slow in the lower part. Runoff is rapid. Available water capacity is high. The content of organic matter is moderately low in the surface layer. The root zone is deep. The capacity to store and release plant nutrients is moderate. A seasonal high water table is perched in the lower part of the subsoil during extended wet periods. The potential for frost action is high.

Most areas are used as cropland or pasture. Some areas are wooded.

This soil is only moderately suited to cultivated crops. Many areas are significantly eroded, and controlling further erosion is the main management concern. The hazard of erosion is severe in cultivated areas. If the soil is cultivated, surface crusting after rains reduces the rate of water infiltration and retards the emergence of seedlings. Using a system of conservation tillage, such as no-till farming, that leaves crop residue on the surface, including grasses and legumes in the cropping system, planting cover crops, tilling on the contour, and establishing grassed waterways can reduce the hazard of erosion. Limiting fieldwork when the surface layer and subsoil are too wet helps to minimize compaction. Using subsurface drains in seepy areas increases crop production in most years.

This soil is well suited to hay and pasture. It is suited to a wide variety of forage plants. Acidity in the root zone and wetness are limitations that affect some legumes. Frost heave can damage deep-rooted legumes, especially in pure stands. Leaving a protective cover on the surface in the fall or seeding a grass-legume mixture can minimize the damage caused by frost heave. If the soil is plowed, the hazard of erosion is moderate. Seeding companion crops, adding mulch, or using no-till seeding methods reduces the hazard of erosion.

This soil is well suited to timber production. It has low strength when wet, however, and cannot support heavy equipment. Spreading aggregate on haul roads or log landings helps to stabilize the surface. Plant competition can be minimized by removing vines and the less desirable trees and shrubs.

This soil is only moderately suited to use as a site for buildings. The seasonal wetness, the moderate shrink-swell potential of the subsoil, and the slope are management concerns. Waterproofing basement walls and installing drains at the base of footings help to keep basements dry. Reinforcing walls with pilasters and concrete, supporting the walls with a large spread footing, and backfilling around foundations with material that has a low shrink-swell potential can minimize the damage caused by shrinking and swelling. The hazard of erosion on construction sites can be reduced by removing as little vegetation as possible, by mulching, or by establishing a temporary plant cover.

This soil is only moderately suited to use as a site for septic tank absorption fields. The seasonal wetness, the restricted permeability, and the slope are management concerns. Perimeter drains can reduce the wetness by lowering the water table. Enlarging the absorption field helps to overcome the restricted permeability. Installing the distribution lines on the contour helps to prevent the surfacing of effluent.

The potential for pond sites varies in individual areas of this soil. The upper part of the soil does not pack well and is poor fill. The lower part of the subsoil and the underlying material commonly can hold water, but excavation may expose porous or shattered rock that permits excessive seepage. Careful onsite investigation is needed.

This soil is recognized as farmland of local importance. The land capability classification is IIIe. The pasture and hayland suitability group is A-6. The woodland ordination symbol is 4A.

Km—Killbuck silt loam, occasionally flooded. This deep, nearly level, poorly drained soil is on flood plains in areas where tributary streams enter former glacial lake valleys and form alluvial fans. Flooding is brief and most commonly occurs following intense local thunderstorms during the growing season. Slopes range from 0 to 2 percent. Most areas are fan shaped and range from 5 to 20 acres in size.

Typically, the upper 28 inches of this soil consists of recent deposits of alluvium. The surface layer is dark grayish brown silt loam about 10 inches thick. The subsoil is about 18 inches thick. It is mottled. The upper part is gray and grayish brown, friable silt loam; the next part is gray, friable silt loam; and the lower part is dark gray, firm silty clay loam. Below this is a very poorly drained buried soil that extends to a depth of 80 inches or more. The upper part is black, mottled, firm silty clay about 7 inches thick. The lower part is gray and brownish gray, mottled, firm silty clay loam. Some areas have less than 15 inches or more than 36 inches of recent alluvium overlying the dark buried soil.

Included with this soil in mapping are areas of Luray, Lorain, and Newark soils. The very poorly drained Luray and Lorain soils are in depressions on lake plains. They do not have a surface deposit of recent alluvium. The somewhat poorly drained Newark soils are on flood plains. Also included are areas in the flood pools of the Dillon Lake dam and the Wills Creek dam that are subject to controlled flooding. Included areas make up about 15 percent of most delineations.

Permeability is moderately slow in the Killbuck soil. Runoff is very slow. Available water capacity is high. The content of organic matter is moderate in the surface layer. The capacity to store and release plant nutrients is high. A seasonal high water table is near the surface from winter through early summer and during other extended wet periods. The root zone is limited by the water table but is deep in areas that have been adequately drained. The shrink-swell potential is moderate. The potential for frost action is high.

Most areas are used as pasture or are wooded. Areas that have not been drained have potential for use as wetland. Some drained areas are used for crops.

If drained, this soil is moderately suited to cultivated crops. Flooding and poor drainage are the main management concerns. The flooding can delay planting and cause damage to crops. Flood damage can be minimized by improving stream channels and keeping them free of debris. Small tributary streams can be channeled into grassed waterways. Surface and subsurface drains commonly are used to lower the water table in areas that have suitable outlets.

This soil is only moderately suited to hay. Areas that have not been drained are suited only to species that can tolerate considerable wetness. Drained areas are suited to a wider variety of species. Seeding a companion crop of small grain or reseeding after wheat has been harvested in midsummer can minimize the damage caused by flooding.

Areas of this soil that have not been drained are suited to bluegrass pasture but are too wet for many legumes. Even in drained areas, species that can tolerate wetness should be selected. Deferring grazing during wet periods helps to prevent excessive compaction of the surface layer and damage to plant roots.

This soil is only moderately suited to timber production. The flooding and the wetness affect the planting, growth, and harvesting of trees. Native bottomland hardwoods that can tolerate flooding and wetness grow well. Selecting water-tolerant species for planting can reduce the seedling mortality rate. Planting and logging should take place during dry periods or when the soil is frozen. The hazard of windthrow can be reduced by using harvesting methods that do not leave the remaining trees isolated or widely spaced. Removing vines and the less desirable trees and shrubs helps to control plant competition.

This soil is generally unsuited to use as a site for buildings or for septic tank absorption fields because of the flooding, the wetness, and the restricted permeability. The flooding is usually brief, but the water table is high during much of the year. Drainage systems that are used to lower the water table are limited by inadequate outlets in many areas. Roads can be elevated above the level of flooding. Culverts should have an adequate capacity to carry the stream flow during periods of flash flooding.

Some sites are suitable for excavated ponds, but onsite investigation is needed to determine the nature of the underlying material. Ponds that have intermittent streams as a water source should have emergency spillways large enough to carry the flow during flash floods. Larger streams should be diverted around the ponds.

The land capability classification is IIIw. The pasture and hayland suitability group is C-3. The woodland ordination symbol is 5W.

LaC—Lakin loamy fine sand, 8 to 15 percent slopes. This deep, strongly sloping, excessively drained soil is on the eastern margin of glacial outwash or lacustrine terraces. It is on well defined knolls or dunes that were formed by wind-deposited fine sand during the postglacial period. Slopes are convex and are dissected in some areas. Individual areas are commonly oblong and range from 3 to 30 acres in size.

Typically, the surface layer is brown, friable loamy fine sand about 9 inches thick. The subsurface layer is yellowish brown loamy fine sand about 15 inches thick. The subsoil is brown and yellowish brown, loose loamy fine sand and friable fine sandy loam about 31 inches thick. The underlying material to a depth of 87 inches or more is pale brown, loose fine sand and yellowish brown, loose loamy fine sand. In many areas, the surface layer is fine sandy loam and the subsoil has a slightly higher content of clay.

Included with this soil in mapping are narrow areas of soils in drainageways that have a surface layer of sandy loam or silt loam and that have a fragipan. These soils have a seasonal high water table in the subsoil. They make up about 20 percent of most delineations.

Permeability is rapid in the Lakin soil. Runoff is slow. Available water capacity is low. The content of organic matter is moderately low in the surface layer. The root zone is deep. The capacity to store and release plant nutrients is low.

This soil is used mainly as cropland. The main crops are corn and grass-legume hay. A few areas are used as pasture or woodland or as sites for buildings.

This soil is only moderately suited to cultivated crops. Droughtiness and erosion are the major management concerns. The soil warms up and dries early in the spring, but it is droughty in summer. Crops that mature early in the growing season are better suited than full-season crops. The hazard of erosion is moderate in cultivated areas. Using a system of conservation tillage, such as no-till farming, that leaves crop residue on the surface conserves moisture and helps to control erosion. Including grasses and legumes in the cropping system, planting cover crops, tilling on the contour, stripcropping, and establishing grassed waterways also reduce the hazard of erosion. Banded or split applications of fertilizer minimize the loss of nutrients, especially nitrogen, and help to prevent the pollution of ground water.

This soil is only moderately suited to hay and pasture. Deep-rooted species that can tolerate droughtiness are the best suited. The early warming of the soil results in good spring growth, but droughtiness limits production later in the growing season. Because of the droughtiness, plants that are seeded early in spring become better established than plants that are seeded later in the growing season. Seeding companion crops, adding mulch, or using no-till seeding methods can reduce the hazard of erosion.

This soil is moderately suited to timber production. No major limitations affect the planting, growth, or harvesting of trees. Growth is slowed by insufficient moisture. Species that can tolerate droughtiness should be selected for planting. Using seedlings that have been transplanted once can reduce the seedling mortality rate.

This soil is well suited to use as a site for buildings. Buildings should be designed to conform to the natural slope of the land. Erosion on construction sites can be minimized by reseeding exposed areas as soon as possible. Caving of trenches is a safety hazard in excavations. Droughtiness limits the establishment of lawns. Newly seeded lawns should be mulched and watered.

This soil is only moderately suited to use as a site for septic tank absorption fields. The soil readily absorbs but does not adequately filter the effluent from septic tank absorption fields. The effluent can pollute ground water. Establishing the absorption field in suitable fill material can improve the filtering capacity of the soil. Laying the lines across the slope can minimize the downslope seepage of effluent.

Ponds constructed in areas of this soil are very unlikely to hold water.

This soil is recognized as farmland of local importance. The land capability classification is IVs. The pasture and hayland suitability group is B-1. The woodland ordination symbol is 3S.

LcD—Lakin-Alford complex, 15 to 25 percent slopes. These deep, moderately steep, well drained soils are on dunes or hillsides on the eastern margin of former glacial lakes or glacial outwash terraces. The Lakin soil formed in windblown fine sand, and the Alford soil formed in windblown silt. The two soils occur as areas so intricately intermingled that they cannot be mapped separately. Most areas are oblong and are 3 to 20 acres in size. They are about 45 percent Lakin soil and 35 percent Alford soil.

Typically, the surface layer of the Lakin soil is dark brown, friable loamy fine sand about 10 inches thick. The subsoil is about 37 inches thick. It consists of alternating bands of brown, friable fine sandy loam and yellowish brown, very friable loamy fine sand. The underlying material to a depth of 77 inches or more is pale brown, loose loamy sand and sand. In some areas the subsoil is not banded and is sandy loam throughout.

Typically, the surface layer of the Alford soil is brown, friable silt loam about 4 inches thick. The subsoil is yellowish brown, firm silt loam about 41 inches thick. The underlying material to a depth of 60 inches or more is yellowish brown, friable silt loam. In some areas the surface layer is loam or very fine sandy loam.

Included with these soils in mapping are small areas of the moderately well drained Glenford, Markland, and Omulga soils. These included soils are in concave landscape positions. Also included are a few narrow flood plains and small areas of sandy soils that have a fragipan. Included areas make up about 20 percent of most delineations.

Permeability is rapid in the Lakin soil and moderate in the Alford soil. Runoff is medium or rapid on both soils. Available water capacity is low in the Lakin soil and high in the Alford soil. Both soils have a deep root zone. The content of organic matter in the surface layer is moderately low in the Lakin soil. It is low in the Alford soil because the plow layer is a mixture of material from the surface layer and the subsoil. The capacity to store and release plant nutrients is low in the Lakin soil and moderate in the Alford soil.

Most areas are used for pasture or hay. Some areas support second-growth stands of native hardwoods.

These soils are poorly suited to cultivated crops. Droughtiness, erosion, tilth, and the content of organic matter are the major management concerns. The hazard of erosion is very severe in cultivated areas. The Lakin soil is droughty. Using no-till farming methods or a system of conservation tillage that leaves crop residue on the surface conserves moisture, helps to control erosion, improves tilth, and increases the content of organic matter. Including grasses and legumes in the cropping system, stripcropping on the contour, and planting cover crops also help to control erosion. Maintaining a permanent plant cover is the best means of controlling erosion. The leaching of plant nutrients, especially nitrogen, is rapid in the Lakin soil. Banded or split applications of fertilizer minimize the loss of nutrients and help to prevent the pollution of ground water.

These soils are only moderately suited to hay and pasture. The early warming of the soils results in good spring growth, but droughtiness during the summer limits production, especially on the Lakin soil. Deep-rooted species that can tolerate droughtiness are the best suited in areas of the Lakin soil. The Alford soil is suited to a wider variety of forage plants. Because of the droughtiness in summer, plants seeded in early spring can become better established than those seeded later in the growing season. Seeding cover crops, adding mulch, or using no-till seeding methods reduces the hazard of erosion.

These soils are only moderately suited to timber production. The aspect of the slope affects the planting and growth of trees. Coves and north- and east-facing slopes are the best woodland sites. They have cooler temperatures and more available water than other sites because they are less exposed to the sun and prevailing winds. The Alford soil has low strength when wet and cannot support heavy equipment. Spreading aggregate on haul roads or log landings helps to stabilize the surface. The slope limits the use of planting and logging equipment. Establishing roads and skid trails on the contour helps to control erosion. Establishing water bars and maintaining a vegetative cover also help to control erosion. Where roads and trails cross channels, adding stones helps to prevent gullying. Species that can tolerate droughtiness should be selected for planting in areas of the Lakin soil. Using seedlings that have been transplanted once or adding mulch can reduce the seedling mortality rate in areas of the Lakin soil and on south-facing slopes in areas of the Alford soil. Plant competition can be controlled on the

Alford soil by removing vines and the less desirable trees and shrubs.

These soils are only moderately suited to use as sites for most buildings because of the slope. Controlling erosion and runoff is a management concern on construction sites. Diverting surface water away from buildings and reseeding as soon as possible after construction help to prevent erosion and water damage. Caving of trench walls is a hazard in excavations. Maintaining as much vegetative cover as possible on the site during construction helps to control erosion. Stockpiling the surface soil and using it to blanket the surface during final grading help to reestablish the plant cover.

These soils are moderately suited to septic tank absorption fields. The thickness of the subsoil is a limitation in areas of the Lakin soil. The sandy underlying material is a poor filter, and untreated effluent that reaches this material can pollute ground water. The Alford soil is a better site for septic tank absorption fields than the Lakin soil. Leach lines should be established across the slope to prevent the surfacing of effluent.

These soils contain poor material for use in earthen dams. Ponds constructed by damming small draws in areas of these soils are likely to have excessive seepage unless they are lined with clay.

The land capability classification is IVe. The pasture and hayland suitability group is B-1 for the Lakin soil and A-2 for the Alford soil. The woodland ordination symbol is 3S for the Lakin soil and 5R for the Alford soil.

Lk—Lindside silt loam, occasionally flooded. This deep, nearly level, moderately well drained soil is on flood plains along the major streams. It is on flats in broad stream valleys and is the dominant soil in some tributary valleys. The flooding is brief and commonly occurs during the dormant season. Slopes range from 0 to 3 percent. Most areas are narrow and winding and range from 10 to 200 acres in size.

Typically, the surface layer is dark grayish brown, friable silt loam about 9 inches thick. The subsoil is yellowish brown and pale brown, friable silt loam about 31 inches thick. It is mottled. The underlying material to a depth of 60 inches or more is dark brown, friable silt loam. Some areas along tributary streams that have a steeper grade have layers of gravelly loam and sandy loam. In a few areas, gravelly sand or loamy sand is at a depth of more than 4 feet. Natural levees that consist of well drained soils are in some areas. Flooding is frequent along some tributaries.

Included with this soil in mapping are small areas of Newark, Melvin, Chagrin, and Tioga soils. The somewhat poorly drained Newark and poorly drained Melvin soils are in depressions and former meander channels. Chagrin and Tioga soils are on alluvial terraces. They are subject to rare flooding. Also included are areas in the flood pools of the Dillon Lake dam and the Wills Creek dam that are subject to controlled flooding. Included areas make up 20 percent of most delineations.

Permeability is moderate or moderately slow in the Lindside soil. Runoff is slow. Available water capacity is high. The content of organic matter is moderate in the surface layer. The root zone is deep. The capacity to store and release plant nutrients is moderate. A seasonal high water table is in the lower part of the subsoil during wet periods. The shrink-swell potential is low. The potential for frost action is high.

Most of the broader areas are used as cropland. Areas in the narrower valleys are used as pasture or woodland. The woodland consists of mixed bottom-land hardwoods.

This soil is well suited to corn and soybeans but is less suited to winter grain crops because of the flooding. If the soil is cultivated, surface crusting after rains reduces the rate of water infiltration and hinders the emergence of seedlings. Shallow cultivation of intertilled crops, however, breaks up the crust. Using no-till farming methods or a system of conservation tillage that leaves crop residue on the surface conserves moisture and increases the rate of water infiltration. Banded or split applications of fertilizer minimize the loss of nutrients, especially nitrogen, and help to prevent the pollution of ground water. Limiting fieldwork when the surface layer and subsoil are too wet helps to minimize compaction. In a few areas, land grading helps surface water to drain faster. Subsurface drains are beneficial in areas of the wetter included soils. Keeping stream channels free of obstructions, such as logjams, helps to prevent flooding. Small levees have been constructed in some areas to reduce the hazard of flooding. Streambank erosion is a major source of sediments that cause water pollution. Streambanks can be stabilized by shaping, planting shrubs, and placing stone riprap in some places. Controlling weeds is difficult because weed seeds are carried in by floodwater. Winter cover crops can protect the soil from scouring. In some areas, grass-lined floodwater channels are needed to handle peak flow and reduce flood damage to cropland. Diversions at the base of slope breaks to the uplands or terraces minimize the damage caused by flash flooding.

This soil is well suited to hay. A wide range of forage species can be planted. Newly seeded plants are subject to occasional flood damage. Damage is more likely in areas where a finely tilled seedbed has been

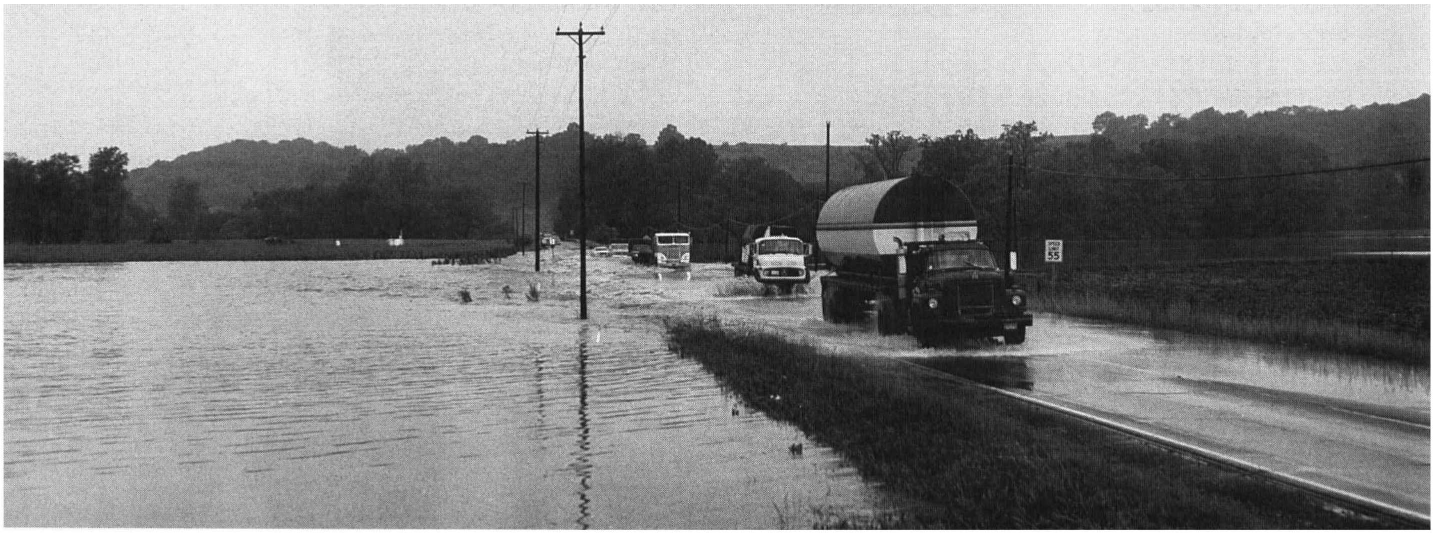

Figure 13.—Flooding in an area of Lindside silt loam, occasionally flooded.

prepared. Plants seeded in summer are less likely to be damaged than those seeded in early spring. Including legumes in the seeding mixture provides nitrogen for subsequent row crops.

This soil is well suited to pasture. A wide variety of forage plants can thrive on this soil. The brief flooding during the growing season reduces the quality of forage plants.

This soil is well suited to timber production. Flooding affects the planting, growth, and harvesting of trees. Native bottom-land hardwoods grow well on this soil. Because flooding is usually brief, most management activities can be performed during periods when the soil is not flooded. Plant competition can be controlled by removing vines and the less desirable trees and shrubs.

This soil is generally unsuited to use as a site for buildings or for septic tank absorption fields because of the flooding and the seasonal wetness (fig. 13). Local roads can be elevated above flood levels, but the fill can partially block the natural floodway and increase the level of flooding upstream. Excavated ponds are unlikely to hold water and are subject to flood damage.

The land capability classification is IIw. The pasture and hayland suitability group is A-5. The woodland ordination symbol is 5A.

Lm—Lobdell loam, channery substratum, occasionally flooded. This deep, nearly level, moderately well drained soil is on flood plains and alluvial fans in narrow valleys along the headwaters of tributary streams. It is subject to very brief periods of flooding, usually in the form of flash floods after intense local thunderstorms during the growing season. The long, narrow areas are commonly split into small fields by tributary channels. Slopes range from 0 to 3 percent. Most areas are 5 to 20 acres in size.

Typically, the surface layer is brown, very friable loam about 6 inches thick. The subsoil is dark yellowish brown, friable silt loam and brown, mottled channery silt loam about 22 inches thick. The underlying material to a depth of 60 inches or more is grayish brown and dark brown, friable and firm channery loam. In many areas the surface layer is gravelly loam. In places siltstone bedrock is at a depth of about 36 to 60 inches. In some areas the subsoil has very gravelly layers.

Included with this soil in mapping are small areas of Newark and Melvin soils. These soils are commonly in slight depressions and abandoned stream channels. They are less well drained than the Lobdell soil. Also included are gently sloping soils on rarely flooded alluvial fans at the base of hillside drainageways, areas in the flood pools of the Dillon Lake dam and the Wills Creek dam that are subject to controlled flooding, and small areas of soils that have bedrock within a depth of 36 inches and that have a low available water capacity. Included areas make up about 20 percent of most delineations.

Permeability is moderate in the Lobdell soil. Runoff is slow. Available water capacity is moderate. The content of organic matter is moderately low or moderate in the surface layer. The root zone is deep in most areas. A seasonal high water table is in the lower part of the subsoil during extended wet periods. The potential for frost action is high. The shrink-swell potential is low.

Most areas are used as pasture or woodland because they are too narrow, small, or irregularly shaped for cultivation. Many local roads follow strips of this soil to avoid steep grades and deep cuts. The roads are subject to washouts during flash floods. A few of the wider areas are used for crops.

The larger areas of this soil are well suited to crop production. Corn and forage plants are commonly grown. Winter grain crops are more susceptible to flood damage than corn or hay. If the soil is cultivated, surface crusting after rains reduces the rate of water infiltration and retards the emergence of seedlings. Shallow cultivation of intertilled crops, however, breaks up the crust. Using no-till farming methods or a system of conservation tillage that leaves crop residue on the surface conserves moisture and increases the rate of water infiltration. Banded or split applications of fertilizer minimize the loss of nutrients, especially nitrogen, and help to prevent the pollution of ground water. Limiting fieldwork when the surface layer and subsoil are too wet helps to minimize compaction. Land grading in a few areas allows surface water to drain faster. Subsurface drains are needed in areas of the wetter included soils. Keeping stream channels free of obstructions, such as logjams, helps to prevent flooding. Streambank erosion is a major source of sediments that pollute the water. Streambanks can be stabilized by shaping, by planting shrubs, and by placing stone riprap in some places. Controlling weeds is difficult because weed seeds are carried in by floodwater. Winter cover crops protect the soil from scouring. In some areas, grass-lined floodwater channels are needed to handle peak flow and minimize damage to cropland. Diversions at the base of slope breaks to the uplands or terraces minimize the damage caused by flash flooding.

This soil is well suited to hay. A wide variety of species can be planted. Flash floods can damage newly seeded plants. The damage can be especially severe in areas of new plantings where a finely tilled seedbed has been prepared. A no-till seeding method should be used.

This soil is well suited to pasture. A wide variety of forage plants can thrive on this soil. The brief flooding during the growing season can reduce the quality of forage. Seeding deep-rooted legumes can increase production. Scouring of the surface layer, deposition of sediments and flood debris, and crusting of the surface layer are management concerns.

This soil is well suited to timber production. Flooding affects the planting, growth, and harvesting of trees. Native bottom-land hardwoods grow well. Because flooding is commonly brief, most management activities can be performed during periods when the soil is not flooded. Some evergreen species can sustain frost damage in the narrow valleys. Plant competition can be controlled by removing vines and the less desirable trees and shrubs.

This soil is generally unsuited to use as a site for buildings or for septic tank absorption fields because of the flooding and the risk of surface-water pollution. The damage to local roads and streets caused by flooding can be minimized by installing culverts that have a capacity to carry the peak flow during periods of flash flooding. Excavated ponds are unlikely to hold water and are subject to flood damage.

The land capability classification is IIw. The pasture and hayland suitability group is A-5. The woodland ordination symbol is 5A.

Lo—Lorain silty clay. This deep, nearly level, very poorly drained soil is in level or depressed areas in former glacial lake valleys. It receives runoff from adjoining soils and is often ponded. Some areas are ponded for most of the year. Most areas range from 20 to 100 acres in size.

Typically, the surface layer is very dark gray, friable silty clay about 7 inches thick. The subsoil is about 53 inches thick. The upper part is dark gray and gray, mottled, firm silty clay. The lower part is dark grayish brown, mottled, very firm clay. In some areas the surface layer is thicker and darker and has a high content of organic matter. These areas are commonly in the deeper depressions. Some places are poorly drained and have less clay in the surface layer and the subsoil. Other places have underlying layers of fine sandy loam or silt loam. In some areas the surface layer is gray.

Included with this soil in mapping are areas of the somewhat poorly drained Fitchville and McGary soils on small knolls. Also included are areas in the flood pools of the Dillon Lake dam and the Wills Creek dam that are subject to controlled flooding. Included areas make up about 15 percent of most delineations.

Permeability is slow in the Lorain soil. Runoff is very slow or ponded. Available water capacity is moderate. The content of organic matter is high in the surface layer. The seasonal high water table is near or above the surface in winter and spring and during other extended wet periods. The root zone is deep except during periods when the water table is high. The capacity to store and release plant nutrients is high. The potential for frost action also is high, and the shrink-swell potential is high in the subsoil.

Undrained areas of this soil are used mainly as woodland or for shrubs. Most of the woodland is second-growth swamp forest. Areas of this soil can be used as wetland. Some areas have been drained and are used for crops. Many areas that are partially drained are used for pasture.

If drained, this soil is moderately suited to crops. Wetness and surface compaction are the major management concerns. Surface and subsurface drainage systems can remove surface water and lower the water table. Establishing and maintaining drainage outlets is expensive in most areas. Ditches are used as outlets in some areas, but the ditches tend to fill with sediment because the gradient is low. A pump drainage system is needed in some areas. Tilling in the fall can minimize compaction of the surface layer because the subsoil is usually drier in the fall than in the spring. Using tillage methods that leave the surface layer rough or ridged and partially covered by crop residue helps to control runoff, increases the rate of water infiltration, and hastens drying. Ridge tillage improves yields.

Drained areas of this soil are moderately suited to hay and pasture. Even in drained areas, grasses and legumes that can tolerate wetness are the best suited. Areas that have not been drained are poorly suited to hay and pasture. Rushes and other kinds of swamp vegetation crowd out the seeded forage plants. Deferred grazing during wet seasons can prevent compaction of the surface layer and damage to plant roots.

This soil is only moderately suited to timber production. Ponding and wetness affect the planting, growth, and harvesting of trees. Native bottom-land hardwoods that can tolerate ponding and wetness grow well. Selecting water-tolerant species for planting reduces the seedling mortality rate. Planting and logging should take place during dry periods or when the soil is frozen. The windthrow hazard can be reduced by using harvesting methods that do not leave the remaining trees isolated or widely spaced.

This soil is well suited to use as habitat for wetland wildlife. Removing vines and the less desirable trees and shrubs can control plant competition.

Because of the ponding, the high shrink-swell potential, and the restricted permeability, this soil is generally unsuited to use as a site for buildings or for septic tank absorption fields. Corrective measures commonly are not practical. There are few natural pond sites, but excavated ponds are likely to hold water.

The land capability classification is IIIw. The pasture and hayland suitability group is C-2. The woodland ordination symbol is 5W.

LpC2—Lowell silt loam, 8 to 15 percent slopes, eroded. This deep, strongly sloping, well drained soil is on dissected uplands. Most areas are on rounded ridgetops or shoulder slopes, but some areas are on benches. Slopes are long and smooth and typically are convex. Erosion has removed part of the original surface layer. Most areas range from 3 to 100 acres in size.

Typically, the surface layer is brown, friable silt loam about 7 inches thick. The subsoil is about 41 inches thick. The upper part is yellowish brown, friable silty clay loam and silty clay. The lower part is light olive brown, grayish brown, and yellowish brown, firm silty clay and silty clay loam. The underlying material to a depth of 60 inches or more is olive, very firm, weathered clay shale and siltstone. In some areas, mottles are at a depth of more than 30 inches. In severely eroded areas the surface layer is silty clay loam. In some places the soil is moderately well drained. Some areas that occur as thin bands around low knolls on ridgetops have a redder subsoil. In areas on benches and foot slopes, the depth to bedrock is more than 5 feet. In many places the subsoil is calcareous and contains fragments of limestone.

Included with this soil in mapping are small areas of Claysville, Gilpin, and Westgate soils. The somewhat poorly drained Claysville soils are in seep spots. Gilpin soils are in the steeper areas. They are moderately deep over siltstone and have less clay in the subsoil than the Lowell soil. Westgate soils are mostly in saddles and near the center of ridgetops. They have less clay in the upper part of the subsoil than the Lowell soil. Included soils make up about 20 percent of most delineations.

Permeability is moderately slow in the Lowell soil. Runoff is rapid in cultivated areas. Available water capacity is moderate. The content of organic matter is moderately low in the surface layer. The root zone is deep. A seasonal high water table is perched in the lower part of the subsoil during extended wet periods. The shrink-swell potential is high in the subsoil. The potential for frost action is moderate.

Most areas are used for cultivated crops and hay. Some areas are used as pasture. A few areas are used as woodland.

This soil is only moderately suited to cultivated crops. Many areas are eroded, and controlling further erosion is the main management concern. The hazard of erosion is severe in cultivated areas. Using a system of conservation tillage, such as no-till farming, that leaves crop residue on the surface, including grasses and legumes in the cropping system, planting cover crops, tilling on the contour, and establishing grassed waterways can reduce the hazard of erosion. Limiting fieldwork when the surface layer and subsoil are too wet helps to minimize compaction. If the soil is cultivated, surface crusting after rains reduces the rate of water infiltration and retards the emergence of seedlings. Using subsurface drains in seepy areas increases crop production in most years.

This soil is well suited to hay and pasture. It is suited to a wide variety of forage plants. If the soil is plowed, the hazard of erosion is moderate. Seeding companion crops, adding mulch, or using no-till seeding methods can reduce the hazard of erosion.

This soil is well suited to timber production. Plant competition can be controlled by removing vines and the less desirable trees and shrubs. The soil has low strength when wet and cannot support heavy equipment. Spreading aggregate on haul roads or log landings helps to stabilize the surface.

This soil is only moderately suited to use as a site for buildings and is poorly suited to septic tank absorption fields. The slope, the seasonal wetness, the high shrink-swell potential, and the restricted permeability are limitations. The hazard of erosion on construction sites can be reduced by removing as little vegetation as possible and by reseeding areas as soon as possible. Reinforcing foundation walls and footings and backfilling trenches with granular material that has a low shrink-swell potential help to prevent the damage caused by shrinking and swelling. Drains around footings can reduce the wetness. Installing leach lines across the slope helps to prevent the surfacing of effluent. Elevating the field increases the depth to the water table, and installing the lines in more permeable fill improves the filtering capacity of the soil. Perimeter drains help to lower the water table. Enlarging the absorption field helps to overcome the restricted permeability.

The watershed area for ponds is limited on the ridgetops. If ponds are excavated only in the clayey layers of this soil, they are likely to hold water. Onsite investigation is needed to determine the thickness of the clayey layers.

This soil is recognized as farmland of local importance. The land capability classification is IIIe. The pasture and hayland suitability group is A-1. The woodland ordination symbol is 4C.

LpD2—Lowell silt loam, 15 to 25 percent slopes, eroded. This deep, moderately steep, well drained soil is on the knolls and ridges of dissected hillsides. Areas on ridges are mainly long and narrow, and areas on knolls are rounded. Slopes are long, smooth, and convex. Most areas range from 10 to 100 acres in size.

Typically, the surface layer is brown, friable silt loam about 8 inches thick. The subsoil is about 49 inches thick. In sequence downward, it is dark brown, friable silty clay loam; strong brown, very firm silty clay; strong brown, very firm clay; and yellowish brown, mottled, very firm clay. The underlying material is brown, firm channery silty clay loam about 13 inches thick. Brown, soft, clay shale bedrock is at a depth of about 70 inches. In some areas the soil is moderately well drained. In many places, the soil is redder and the subsoil contains more clay. In severely eroded areas the surface layer is silty clay loam. In many areas the subsoil is moderately alkaline and is limy.

Included with this soil in mapping are small areas of Westgate, Berks, Gilpin, and Westmoreland soils. Westgate soils are in the less sloping areas. They have less clay in the upper part of the subsoil than the Lowell soil. Westmoreland soils and the moderately deep Berks and Gilpin soils are on the steeper slopes. Westmoreland soils are less clayey than the Lowell soil. Included soils make up about 20 percent of most delineations.

Permeability is moderately slow in the Lowell soil. Runoff is very rapid. Available water capacity is moderate. The content of organic matter is moderately low in the surface layer. The root zone is deep. The capacity to store and release plant nutrients is high. A seasonal high water table is perched in the lower part of the subsoil in the spring or during other wet periods. The shrink-swell potential is high. The potential for frost action is moderate.

Most areas are used as pasture. Some wooded areas are used for grazing. Many areas that are no longer farmed are held as coal or oil reserves. These areas have a cover of native grasses, briers, shrubs, and young hardwoods.

This soil is poorly suited to cultivated crops. Many areas are eroded, and controlling further erosion is the main management concern. The hazard of erosion is very severe in cultivated areas. Maintaining a permanent plant cover is the best means of controlling erosion. Using a system of conservation tillage, such as no-till farming, that leaves crop residue on the surface, including grasses and legumes in the cropping system, planting cover crops, tilling on the contour, and establishing grassed waterways can reduce the hazard of erosion. Limiting fieldwork when the surface layer and subsoil are too wet helps to minimize compaction. If the soil is cultivated, surface crusting after rains reduces the rate of water infiltration and retards the emergence of seedlings. Using subsurface drains in seepy areas increases crop production in most years.

This soil is moderately suited to hay and pasture, but it is poorly suited to winter grazing. It is suited to a wide variety of forage plants. If the soil is plowed, the hazard of erosion is severe. Seeding companion crops, adding mulch, or using no-till seeding methods can reduce the hazard of erosion. Restricting grazing during wet periods helps to prevent compaction of the surface layer and damage to plant roots.

This soil is only moderately suited to timber production. The aspect of the slope affects the planting and growth of trees. Coves and north- and east-facing slopes are the best woodland sites. They have cooler temperatures and more available water than other sites because they are less exposed to the sun and prevailing winds. The soil has low strength when wet and cannot support heavy equipment. Spreading aggregate on haul roads or log landings helps to stabilize the surface. The slope limits the use of planting and logging equipment. Establishing roads and skid trails on the contour helps to control erosion. Establishing water bars and maintaining a vegetative cover also help to control erosion. Where roads and trails cross channels, adding stones helps to prevent gullying. Using planting techniques that spread the roots of seedlings and increase soil-root contact can reduce the seedling mortality rate. Using seedlings that have been transplanted once or adding mulch can reduce the seedling mortality rate on south-facing slopes. Plant competition can be controlled by removing vines and the less desirable trees and shrubs.

This soil is poorly suited to use as a site for buildings. The slope and the high shrink-swell potential are management concerns. On construction sites, the hazard of erosion can be reduced by removing as little vegetation as possible, by mulching, and by establishing a temporary plant cover on the surface. On sites for local roads and streets, the hazard of erosion can be reduced by building on the contour and by seeding road cuts. Installing reinforced concrete foundation walls and footings and backfilling trenches with granular material that has a low shrink-swell potential help to prevent the structural damage caused by shrinking and swelling.

This soil is generally unsuited to use as a site for septic tank absorption fields because of the seasonal wetness, the restricted permeability, and the slope. The surfacing of effluent is very likely and can cause pollution of streams.

The watershed area for ponds is very limited on the ridgetops. Excavated ponds are likely to hold water unless layers of porous or shattered rock below the clay shale are exposed. Onsite investigation is needed to determine the thickness of the clayey layers.

The land capability classification is IVe. The pasture and hayland suitability group is A-2. The woodland ordination symbol is 4C on north aspects and 3C on south aspects.

LrE2—Lowell-Gilpin complex, 25 to 40 percent slopes, eroded. These steep, well drained soils are on dissected hillsides. The Lowell soil is on the less sloping parts of hillsides and benches. The Gilpin soil is on the steeper bluffs. Erosion has removed part of the original surface soil, and scars and gullies are common. The two soils occur as alternating strips across the hillside that are too small to map separately. Most areas range from 20 to 250 acres in size. They are about 45 percent Lowell soil and 35 percent Gilpin soil.

The Lowell soil is deep. Typically, the surface layer is dark yellowish brown, friable silt loam about 7 inches thick. The subsoil is about 41 inches thick. The upper part is dark brown, friable silty clay loam. The lower part is dark brown, firm channery silty clay and light olive brown, firm silty clay. The underlying material to a depth of 60 inches or more is light olive brown, very firm channery silty clay loam. In some severely eroded areas, the surface layer is silty clay loam. Some areas on benches are moderately well drained. In places the subsoil is calcareous and has common fragments of limestone. In some areas the soil has reddish brown colors.

The Gilpin soil is moderately deep. Typically, the surface layer is brown, friable channery silt loam about 2 inches thick. The subsoil is about 20 inches thick. It is light olive brown and pale brown, friable channery and very channery silt loam. Weathered siltstone bedrock is at a depth of about 22 inches. In places the bedrock is at a depth of more than 5 feet. In some areas on the steeper slopes, the soil is shallow or moderately deep and is very channery throughout. Outcrops of siltstone bedrock are on the side slopes of ravines.

Included with these soils in mapping are small areas of Claysville and Westgate soils. The somewhat poorly drained Claysville soils are around seep spots, especially in bands of the Lowell soil. The moderately well drained Westgate soils are on the less sloping benches. Included soils make up about 20 percent of most delineations.

Permeability is moderately slow in the Lowell soil and is moderate in the Gilpin soil. Runoff is very rapid on both soils. Available water capacity is high in the Lowell soil and is very low in the Gilpin soil. The potential for frost action is moderate in both soils. The content of organic matter is moderately low in the surface layer. The root zone is deep in the Lowell soil and moderately deep in the Gilpin soil. The shrink-swell potential is high in the Lowell soil and low in the Gilpin soil.

Most areas are used as pasture or woodland or as habitat for woodland wildlife.

These soils are generally unsuited to cultivation because of the slope and a very severe hazard of erosion. Maintaining a permanent plant cover is the best means of controlling erosion.

These soils are poorly suited to hay and pasture. They are suited to a wide variety of forage plants, but seeding and applying fertilizer are difficult. The slope limits the use of farm equipment. Forage production is low on the Gilpin soil during dry periods. If the soils are plowed, the hazard of erosion is very severe. Seeding companion crops, adding mulch, or using no-till seeding methods can reduce the hazard of erosion. After a pasture is established, it should be maintained for as long as possible. Erosion can be severe unless a thick sod is maintained.

These soils are only moderately suited to timber production. The aspect of the slope affects the planting and growth of trees. Coves and north- and east-facing slopes are the best woodland sites. They have cooler temperatures and more available water than other sites because they are less exposed to the sun and prevailing winds. The soils have low strength when wet and cannot support heavy equipment. Spreading aggregate on haul roads or log landings helps to stabilize the surface. Establishing roads and skid trails on the contour helps to control erosion. Establishing water bars and maintaining a vegetative cover also help to control erosion. Using planting techniques that spread the roots of seedlings and that increase soil-root contact can reduce the seedling mortality rate. Plant competition can be minimized by removing vines and the less desirable trees and shrubs.

These soils are generally unsuited to use as sites for buildings or for septic tank absorption fields. The slope limits the use of equipment and is a severe limitation on sites for buildings. If septic tank absorption fields are installed, excessive downslope seepage of effluent is likely because of the slope. Hillside slippage is a hazard in areas of the Lowell soil.

Areas of these soils have poor potential for pond sites. Layers of shattered rock that permit excessive seepage are on the side slopes of most draws.

The land capability classification is VIe. The pasture and hayland suitability group is A-3. The woodland ordination symbol is 5R for the Lowell soil and 4R for the Gilpin soil.

LrF—Lowell-Gilpin complex, 40 to 70 percent slopes. These very steep, well drained soils are on dissected hillsides. The Lowell soil is commonly on narrow benches and the less sloping parts of hillsides. The Gilpin soil is on the steeper bluffs. Landslides are common in some areas. The two soils occur as areas so intricately mixed that mapping them separately is not practical. Most areas are 30 to 300 acres in size. They are about 45 percent Lowell soil and 30 percent Gilpin soil.

The Lowell soil is deep. Typically, the surface layer is brown, friable silt loam about 4 inches thick. The subsoil is about 50 inches thick. The upper part is dark brown, firm silty clay loam. The next part is yellowish brown and light yellowish brown, firm silty clay. The lower part is variegated strong brown, olive brown, and brown, firm silty clay. The underlying material is brown, firm channery silty clay. In some areas the subsoil is reddish brown. In other areas, the subsoil is limy and limestone fragments are throughout the soil. In many severely eroded areas, the surface layer is silty clay. Areas on some of the less sloping benches are moderately well drained.

The Gilpin soil is moderately deep. Typically, the surface layer is brown, friable channery silt loam about 4 inches thick. The subsoil is about 26 inches thick. The upper part is yellowish brown, friable channery silt loam and channery silty clay loam, and the lower part is dark yellowish brown, friable very channery silt loam. Olive shale bedrock is at a depth of about 30 inches. In some areas the bedrock is at a depth of more than 40 inches.

Included with these soils in mapping are small areas of Westgate, Berks, and Claysville soils. The moderately well drained Westgate soils are on some of the wider benches. Berks soils are on the steepest slopes. They are more channery than the Lowell and Gilpin soils. The somewhat poorly drained Claysville soils are in seepy areas. Also included are a few areas of massive sandstone rock outcrops. Included areas make up about 25 percent of most delineations.

Permeability is moderately slow in the Lowell soil and moderate in the Gilpin soil. Runoff is very rapid on both soils. Available water capacity is high in the Lowell soil and very low in the Gilpin soil. The root zone is deep in the Lowell soil and moderately deep in the Gilpin soil.

Most areas are wooded. Past logging practices and grazing have left the stands dominated by the less desirable trees. Some areas are dominated by thorny brush and thickets.

Because of the slope, areas of these soils are not suited to crops or pasture. Maintaining a permanent vegetative cover is the best means of controlling erosion.

These soils are only moderately suited to timber production. The slope limits the use of planting and logging equipment. The aspect of the slope affects the planting and growth of trees. Coves and north- and east-facing slopes are the best woodland sites. They have cooler temperatures and more available water than other sites because they are less exposed to the sun and prevailing winds. The soils have low strength when wet and cannot support heavy equipment. Spreading aggregate on haul roads or log landings helps to stabilize the surface. Establishing roads and skid trails on the contour helps to control erosion. Establishing water bars and maintaining a vegetative cover also help to control erosion. Using planting techniques that spread the roots of seedlings and that increase soil-root contact can reduce the seedling mortality rate. Plant competition can be controlled by removing vines and the less desirable trees and shrubs.

These soils are unsuited to use as sites for buildings or for septic tank absorption fields because of the slope. The slope limits the use of equipment. The Lowell soil is subject to slippage. Also, the restricted permeability in the Lowell soil and the moderate depth to bedrock in the Gilpin soil are limitations.

The potential for ponds is poor. Layers of shattered or porous rock that permit excessive seepage are on the sides of many draws in areas of these soils.

The land capability classification is VIIe. The pasture and hayland suitability group is H-1. The woodland ordination symbol is 5R for the Lowell soil and 4R for the Gilpin soil.

Lu—Luray silty clay loam. This deep, nearly level, very poorly drained soil is on the terraces of former glacial lakes. It is in level or depressional areas that receive runoff from surrounding soils. Slopes range from 0 to 2 percent. Most areas are irregular in shape and range from 5 to 80 acres in size.

Typically, the surface layer and the subsurface layer are very dark gray and black, firm silty clay loam. They have a combined thickness of about 16 inches. The subsoil is firm silty clay loam about 39 inches thick. It is mottled. The upper part is dark gray and gray, and the lower part is light olive gray. The underlying material to a depth of 60 inches or more is light olive gray, mottled, firm silt loam. In some areas the surface layer is silty clay or silt loam. In a few places the dark surface layer is thinner.

Included with this soil in mapping are small areas of Fitchville, Sebring, and Lorain soils. The somewhat poorly drained Fitchville soils are on slightly elevated knolls. The poorly drained Sebring soils have a surface layer that is lighter colored than that of the Luray soil. The very poorly drained Lorain soils are in small depressions. They are more clayey than the Luray soil. Also included are areas in the flood pools of the Dillon Lake dam and the Wills Creek dam that are subject to controlled flooding. Included areas make up about 20 percent of most delineations.

Permeability is moderately slow in the Luray soil. Runoff is very slow or ponded. Available water capacity is high or very high. The content of organic matter is high. A seasonal high water table is at or above the surface during extended wet periods and is within the root zone well into the growing season. Rooting depth is limited by the seasonal high water table. The capacity to store and release plant nutrients is high. The shrink-swell potential is moderate.

Most areas are drained and are used as cropland. Areas that have not been drained are used mainly as woodland. Most of the woodland is second-growth swamp forest. A few partially drained areas are used as pasture. This soil is well suited to use as habitat for wetland wildlife.

If drained, this soil is well suited to crops. Wetness is the main management concern. A complete system of subsurface drains is needed to provide adequate drainage. Surface drains can be used in ponded areas. Ditches are needed to provide outlets in many areas, but the ditches are expensive to establish and maintain. Fall tillage is less likely to result in surface compaction than spring tillage because the subsoil is usually drier in the fall. Using tillage methods that leave a rough or ridged surface that is partially covered by crop residue helps to control runoff, increases the rate of water infiltration, and hastens drying. Ridge tilling improves yields.

Drained areas are only moderately suited to hay and pasture. Species that can tolerate wetness are the best suited. Few areas are drained sufficiently for alfalfa. Areas that have not been drained are poorly suited to hay and pasture. Rushes and swamp grass crowd out the forage species. Extended periods of ponding can damage or kill the sod. Deferred grazing during wet seasons prevents compaction of the surface layer and damage to plant roots.

This soil is only moderately suited to timber production. The ponding and the wetness affect the planting, growth, and harvesting of trees. Native bottom-land hardwoods that can tolerate ponding and wetness grow well. Selecting water-tolerant species for planting reduces the seedling mortality rate. Planting and logging should be carried out during dry periods or when the soil is frozen. The hazard of windthrow can be reduced by using harvesting methods that do not leave the remaining trees isolated or widely spaced. Removing vines and the less desirable trees and shrubs helps to control plant competition.

This soil is poorly suited to use as a site for buildings and is generally unsuited to use as a site for septic tank absorption fields. The wetness, the ponding, and the restricted permeability are severe limitations. Ditches, subsurface drains, and storm sewers can improve the drainage system. Agricultural drains generally should be deepened and enlarged to carry storm-water runoff from residential areas. Installing drains at the base of footings and coating exterior basement walls help to keep basements dry. Establishing a drainage system that is adequate for septic tank absorption fields is very difficult and expensive.

There are few natural pond sites. Excavated ponds vary considerably in their ability to hold water. Onsite investigation is needed to determine the nature of the underlying material.

The land capability classification is IIw. The pasture and hayland suitability group is C-1. The woodland ordination symbol is 5W.

MaB—Markland silt loam, 2 to 6 percent slopes. This deep, gently sloping, moderately well drained soil is on lacustrine terraces in valleys that once held glacial lakes. Most areas are irregular in shape and are 5 to 40 acres in size.

Typically, the surface layer is brown, friable silt loam about 7 inches thick. The subsoil is yellowish brown, firm silty clay loam and silty clay about 29 inches thick. It has common gray mottles and coatings at a depth of more than 18 inches. The underlying material to a depth of 80 inches or more is yellowish brown, firm, laminated silty clay loam. In some areas the surface layer is loam. Some of the more sloping areas are eroded and have a surface layer of silty clay loam. In some of the less sloping areas, the subsoil has less clay. In some places the underlying material is silt loam and fine sandy loam.

Included with this soil in mapping are small areas of Watertown, Lorain, and Sebring soils. The well drained Watertown soils are on ridges. They are sandier than the Markland soil. The poorly drained Lorain and Sebring soils are in depressions where surface water accumulates. Also included are areas in the flood pools of the Dillon Lake dam and the Wills Creek dam that are subject to controlled flooding. Included areas make up less than 20 percent of most delineations.

Permeability is slow in the Markland soil. Runoff is medium. Available water capacity is moderate. The content of organic matter is moderate in the surface layer. The root zone is deep, but the clayey subsoil restricts the root development of some species. A seasonal high water table is in the lower part of the subsoil in late winter and in spring and during other extended wet periods. The capacity to store and release plant nutrients is high. The shrink-swell potential is high in the subsoil and underlying material. The potential for frost action is moderate.

Most areas are used as cropland. A few areas are used as pasture or woodland.

This soil is only moderately suited to cultivated crops. The hazard of erosion is severe in cultivated areas. Erosion exposes the clayey subsoil. If the soil is cultivated, surface crusting after rains reduces the rate of water infiltration and retards the emergence of seedlings. Using a system of conservation tillage, such as no-till farming, that leaves crop residue on the surface, including grasses and legumes in the cropping system, planting cover crops, tilling on the contour, and establishing grassed waterways can reduce the hazard of erosion. The soil dries and warms up slowly in the spring because of the clayey subsoil. Limiting fieldwork when the surface layer and subsoil are too wet helps to minimize compaction. Subsurface drains are moderately effective in reducing wetness in scattered low areas.

This soil is moderately suited to hay and pasture. It is also suited to a variety of forage plants. The clayey subsoil restricts the root development of some species. Frost heave can damage deep-rooted legumes, especially in pure stands. Leaving a protective cover of vegetation on the surface in the fall or including grasses in the seeding mixture can minimize the damage caused by frost. If the soil is plowed, the hazard of erosion is moderate. Seeding companion crops, adding mulch, or using no-till seeding methods can reduce the hazard of erosion.

This soil is only moderately suited to timber production. The clayey subsoil affects the planting and growth of trees. The soil has low strength when wet and cannot support heavy equipment. Spreading aggregate on haul roads or log landings helps to stabilize the surface. Using planting techniques that spread the roots of seedlings and increase soil-root contact can reduce the seedling mortality rate. Plant competition can be controlled by removing vines and the less desirable trees and shrubs. The hazard of windthrow can be reduced by using logging methods that do not leave the remaining trees widely spaced.

This soil is only moderately suited to use as a site for buildings. Reinforcing foundations and footing walls helps to prevent the damage caused by shrinking and swelling of the subsoil. Installing foundation drains and using sealers on basement walls help to minimize seepage.

This soil is poorly suited to use as a site for septic tank absorption fields. Specially designed absorption fields are needed because of the seasonal wetness and the restricted permeability. Perimeter drains can reduce the wetness by lowering the water table. Elevating the field with more permeable fill material helps to overcome the restricted permeability. Aeration systems should be considered as an alternative to a standard septic tank absorption field.

Excavated ponds are likely to hold water. The clayey soil material is hard to pack when wet.

The land capability classification is IIIe. The pasture and hayland suitability group is F-5. The woodland ordination symbol is 4C.

MbC2—Markland silty clay loam, 6 to 15 percent slopes, eroded. This deep, strongly sloping, moderately well drained soil is on the dissected terraces of former glacial lakes. The surface is crossed by many small drainage channels. Slopes are short and irregular. The upper slopes are convex, and the lower slopes are concave. Erosion has removed part of the original surface layer, and the present surface layer is mixed with subsoil material. Most areas are fan-shaped or U-shaped bands. They range from 5 to 30 acres in size.

Typically, the surface layer is brown, firm silty clay loam about 6 inches thick. The subsoil is 24 inches thick. The upper part is yellowish brown, firm silty clay. The lower part is yellowish brown, mottled silty clay and silty clay loam. The underlying material to a depth of 60 inches or more is yellowish brown, mottled, firm silty clay loam. In some areas that are not eroded, the surface layer is silt loam. In many places the subsoil has less clay and is more permeable. Some areas on knolls are well drained.

Included with this soil in mapping are small areas of Watertown, McGary, and Fitchville soils. Watertown soils are in areas where layers of sand are interbedded with clay sediments. The somewhat poorly drained McGary and Fitchville soils are along drainageways. Also included are areas in the flood pools of the Dillon Lake dam and the Wills Creek dam that are subject to controlled flooding. Included areas make up about 20 percent of most delineations.

Permeability is slow in the Markland soil. Runoff is rapid. Available water capacity is moderate. The content of organic matter is moderately low in the surface layer because of erosion. Tilth is only fair. The root zone is potentially deep, but the clayey subsoil restricts the roots of some species. A seasonal high water table is in the lower part of the subsoil in late winter and in spring and during other extended wet periods. The capacity to store and release plant nutrients is moderate. The shrink-swell potential is high in the subsoil and the underlying material because of the high content of clay.

Most areas are used as cropland. A few areas are used as pasture or woodland.

This soil is poorly suited to cultivated crops. The hazard of erosion is very severe in cultivated areas. If the soil is cultivated, surface crusting after rains reduces the rate of water infiltration and retards the emergence of seedlings. Using a system of conservation tillage, such as no-till farming, that leaves crop residue on the surface, including grasses and legumes in the cropping system, planting cover crops, tilling on the contour, and establishing grassed waterways can reduce the hazard of erosion. Limiting fieldwork when the surface layer and subsoil are too wet helps to minimize compaction. Using subsurface drains in seepy areas increases crop production in most years.

This soil is moderately suited to hay and is well suited to pasture. It is suited to most of the commonly grown forage plants, but the clayey subsoil restricts the root development of some species. Frost heave can damage deep-rooted legumes, especially in pure stands. Leaving a protective cover of vegetation on the surface in the fall and including grasses in the seeding mixture can minimize the damage caused by frost. If the soil is plowed, the hazard of erosion is moderate. Seeding companion crops, adding mulch, or using no-till seeding methods reduces the hazard of erosion.

This soil is only moderately suited to timber production. The clayey subsoil affects the planting and growth of trees. The soil has low strength when wet and cannot support heavy equipment. Spreading aggregate on haul roads or log landings helps to stabilize the surface. Using planting techniques that spread the roots of seedlings and increase soil-root contact can reduce the seedling mortality rate. Plant competition can be controlled by removing vines and the less desirable trees and shrubs. Using logging methods that do not leave the remaining trees widely spaced can reduce the hazard of windthrow.

This soil is only moderately suited to use as a site for buildings and is generally unsuited to use as a site for septic tank absorption fields. The seasonal wetness and shrinking and swelling of the subsoil are limitations on sites for buildings. Reinforcing foundation walls and footings helps to prevent the structural damage caused by shrinking and swelling. Installing foundation drains and using sealers on basement walls minimizes seepage. Removing as little vegetation as possible and reseeding exposed areas help to prevent further erosion on construction sites. The seasonal wetness, the restricted permeability, and the slope are management concerns on sites for septic tank absorption fields.

Ponds can be established by damming small drainageways in areas of this soil. If used at the proper moisture content, the soil material packs well and can be used as fill.

The land capability classification is IVe. The pasture and hayland suitability group is F-5. The woodland ordination symbol is 4C.

McD2—Markland-Glenford complex, 15 to 35 percent slopes, eroded. These deep, moderately steep and steep, moderately well drained soils are on the highly dissected remnants of terraces in the valleys of former glacial lakes. They formed in alternating beds of clay, silt, and fine sand. The Markland soil is typically on the upper parts of hillsides and at the head of small ravines. The Glenford soil is typically on the less sloping lower parts of hillsides, where slopes range from 15 to 25 percent. Most areas of these soils are narrow and have slopes that face a major stream valley. They range from 5 to 25 acres in size. They are about 40 percent Markland soil and 30 percent Glenford soil.

The two soils occur as areas so narrow and intermingled that it is impractical to map them separately.

Typically, the surface layer of the Markland soil is dark brown, friable silty clay loam about 7 inches thick. The subsoil is yellowish brown, firm silty clay and silty clay loam about 24 inches thick. It is mottled in the lower part. The underlying material extends to a depth of 80 inches or more. It consists of thin alternating layers of silt loam and silty clay loam. Gullies are common in some severely eroded areas along drainageways.

Typically, the surface layer of the Glenford soil is dark grayish brown, friable silt loam about 8 inches thick. The subsoil is yellowish brown, firm silt loam about 22 inches thick. The underlying material extends to a depth of 60 inches or more. It consists of thin alternating layers of fine sandy loam and silt loam. The slope is more than 35 percent in many areas along ravines or in places where streams have undercut hillsides. Some areas are well drained. In a few areas a fragipan is in the lower part of the subsoil.

Included with these soils in mapping are small areas of Watertown, Newark, and Melvin soils and small areas of Rodman soils. The well drained Watertown soils formed in sandy sediments. Newark and Melvin soils are on narrow flood plains in the larger ravines. Rodman soils are more gravelly than the Markland and Glenford soils. Also included are areas in the flood pools of the Dillon Lake dam and the Wills Creek dam that are subject to controlled flooding and areas of small rock ledges and outcrops. Included areas make up about 30 percent of most delineations.

Permeability is slow in the Markland soil and moderately slow or moderate in the Glenford soil. Runoff is rapid on both soils. Available water capacity is moderate in the Markland soil and high in the Glenford soil. The content of organic matter is moderately low in the surface layer of both soils. The root zone is potentially deep, but the clayey subsoil in the Markland soil restricts the roots of some species. A seasonal high water table is in the lower part of the subsoil in both soils during extended wet periods. The shrink-swell potential is high in the Markland soil and moderate in the Glenford soil. The potential for frost action is moderate in the Markland soil and high in the Glenford soil.

Most areas are used for pasture or support second-growth woodland. Many areas were cultivated in the past, but tillage is no longer practical because of erosion and the formation of gullies.

These soils are generally unsuited to cultivation because of the slope and a very severe hazard of erosion. Maintaining a permanent plant cover is the best means of controlling erosion.

These soils are poorly suited to hay and are only moderately suited to pasture. They are suited to most of the commonly grown forage plants in areas where the slope does not interfere with intensive management. In many areas the slope limits the use of equipment that is needed for seeding and harvesting hay crops and for improving pastures. In such areas, pastures of native grasses can be moderately productive unless they are overgrazed. Frost heave can damage deep-rooted legumes. Leaving a plant cover on the surface in the fall or seeding a grass-legume mixture can minimize the damage caused by frost heave. If the soils are plowed, the hazard of erosion is severe. Seeding companion crops, adding mulch, or using no-till seeding methods can reduce the hazard of erosion.

These soils are moderately suited to timber production. The aspect of the slope affects the planting and growth of trees. Coves and north- and east-facing slopes are the best woodland sites. They have cooler temperatures and more available water than other sites because they are less exposed to the sun and prevailing winds. The soils have low strength when wet and cannot support heavy equipment. Spreading aggregate on haul roads or log landings helps to stabilize the surface. The slope limits the use of planting and logging equipment. Establishing roads and skid trails on the contour, establishing water bars, and maintaining a vegetative cover help to control erosion. Where roads and trails cross channels, adding stones helps to prevent gullying. Using planting techniques that spread the roots of seedlings and that increase soil-root contact can reduce the seedling mortality rate in areas of the Markland soil. Using seedlings that have been transplanted once or adding mulch can reduce the seedling mortality rate on south-facing slopes. Plant competition can be minimized by removing vines and the less desirable trees and shrubs. The hazard of windthrow on the Markland soil can be reduced by using harvesting methods that do not leave the remaining trees isolated or widely spaced.

These soils are poorly suited to use as sites for buildings because of the slope, the high shrink-swell potential, and the seasonal wetness. Erosion and runoff are problems on construction sites. Diverting surface water away from buildings and reseeding exposed areas as soon as possible help to prevent erosion and water damage. Shrinking and swelling of the subsoil can affect foundations. Reinforcing foundation walls and footings and backfilling with granular material can reduce the structural damage caused by shrinking and swelling. Saturated zones have low strength and may slide if slopes are too steep or if heavy loads are added. Installing drains around footings can reduce the wetness around foundations and in basements.

These soils are generally unsuited to use as sites for septic tank absorption fields because of the slope, the restricted permeability, and the seasonal wetness.

The suitability for ponds varies considerably in areas of this map unit. Careful onsite investigation is needed.

The land capability classification is VIe. The pasture and hayland suitability group is F-5 for the Markland soil and A-2 for the Glenford soil. The woodland ordination symbol is 4R for the Markland soil and 5R for the Glenford soil.

MdA—McGary silt loam, 0 to 3 percent slopes. This deep, nearly level, somewhat poorly drained soil is on terraces in the valleys of former glacial lakes. Most areas are round or irregular in shape and range from 5 to 320 acres in size.

Typically, the surface layer is dark grayish brown, friable silt loam about 6 inches thick. The subsoil is yellowish brown and brown, mottled, firm silty clay loam and silty clay about 34 inches thick. The underlying material to a depth of 60 inches or more is brown, mottled, very firm silty clay loam. In many areas the surface layer is silty clay loam and is darker. In some places the subsoil is less clayey. A few areas along drainageways and near slope breaks have slopes of 3 to 8 percent.

Included with this soil in mapping are narrow strips of the very poorly drained Lorain soils in drainageways and depressions. Also included are areas of the moderately well drained Markland soils on dissected slopes. Included soils make up about 20 percent of most delineations.

Permeability is slow or very slow in the McGary soil. Runoff is slow. Available water capacity is moderate. The content of organic matter is moderate in the surface layer. A seasonal high water table is in the upper part of the subsoil in winter and spring and during other extended wet periods. Rooting depth is limited by the water table. The capacity to store and release plant nutrients is moderate. The shrink-swell potential is high. The potential for frost action is moderate.

Most areas are used for crops, but some areas that have not been drained are used for pasture. A few wooded areas support second-growth stands of water-tolerant hardwoods, such as pin oak, ash, and elm.

If drained, McGary soils are moderately suited to cultivated crops. Wetness is the main management concern. It commonly delays planting and harvesting and restricts the growth of roots. Surface drains are used in some areas to remove excess surface water. A complete system of closely spaced subsurface drains is effective in most areas, but water moves slowly into the drains. The roots of perennial crops form channels that increase the movement of water into subsurface drains. Surface crusting after heavy rains reduces the rate of water infiltration and retards the emergence of seedlings. Tilling or harvesting when the soil is too wet results in compaction of the surface layer. Using tillage methods that leave a rough or ridged surface that is partially covered by crop residue helps to control runoff, increases the rate of water infiltration, and hastens drying.

If drained, this soil is moderately suited to hay and pasture. Grasses and legumes that can tolerate wetness are the best suited. Areas that have not been drained are suited to bluegrass pasture but are too wet for most legumes. Deferred grazing during wet periods helps to prevent compaction of the surface layer and damage to plant roots.

This soil is only moderately suited to timber production. Seasonal wetness and the clayey subsoil affect the planting, growth, and harvesting of trees. The soil has low strength when wet and cannot support heavy equipment. Spreading aggregate on haul roads or log landings helps to stabilize the surface. Using planting techniques that spread the roots of seedlings and that increase soil-root contact can reduce the seedling mortality rate. Removing vines and the less desirable trees and shrubs helps to control plant competition. Using logging techniques that do not leave the remaining trees widely spaced can reduce the hazard of windthrow.

This soil is poorly suited to buildings and septic tank absorption fields. The high shrink-swell potential and the seasonal wetness are limitations on sites for buildings. The soil is best suited to use as a site for houses without basements. Ditches and subsurface drains can improve drainage, but adequate outlets are not available in some areas. Grading the building sites helps to divert surface water away from foundations. Excavations for foundations and basements should be backfilled with granular material that has a low shrink-swell potential. Reinforcing foundation walls and footings helps to prevent the damage caused by shrinking and swelling. Installing drains at the base of footings and coating exterior basement walls help to prevent wet basements. Drains also can be installed under foundation slabs.

The seasonal wetness and the restricted permeability are limitations on sites for septic tank absorption fields. Perimeter drains are moderately effective in lowering the seasonal high water table. Enlarging the absorption field or installing the lines in more permeable fill helps to overcome the restricted permeability. Aeration systems require a smaller leach field, but perimeter drains can reduce the wetness.

There are few natural pond sites. Excavated ponds are likely to hold water.

This soil is recognized as farmland of local importance. The land capability classification is IIIw. The pasture and hayland suitability group is C-2. The woodland ordination symbol is 4W.

Me—Melvin silt loam, frequently flooded. This deep, nearly level, poorly drained soil is on flood plains. It is on bottom land along small streams and depressions or swales of old channels in the larger stream valleys. Slopes are 0 to 2 percent. Some areas are saturated most of the year because of ponding caused by beavers or by seepage. Flooding is brief and usually occurs during the dormant season, but flash floods may occur during the growing season following intense local thunderstorms. Most areas are narrow and winding and range from 3 to 40 acres in size.

Typically, the surface layer is dark grayish brown, friable silt loam about 3 inches thick. The underlying material to a depth of 60 inches or more is gray, very dark gray, and light brownish gray, friable silt loam and loam. In some areas the underlying material is shale or siltstone bedrock. In places the subsoil is loam and sandy loam. In a few areas a buried soil is below recent silty alluvium. Some areas are ponded.

Included with this soil in mapping are many areas of the somewhat poorly drained Newark soils and a few areas of Lindside and Nolin soils. Lindside and Nolin soils are on slightly elevated knobs and ridges. They are better drained than the Melvin soil. Also included are areas in the flood pools of the Dillon Lake dam and the Wills Creek dam that are subject to controlled flooding. Included areas make up about 25 percent of most delineations.

Permeability is moderate in the Melvin soil. Runoff is very slow. Available water capacity is very high. A seasonal high water table is at or near the surface during winter and spring. The water table is within the root zone well into the growing season and limits the rooting depth. The content of organic matter is moderate in the surface layer. The capacity to store and release plant nutrients is moderate. The shrink-swell potential is low. The potential for frost action is high.

Most areas are used as pasture or as habitat for wetland wildlife. A few drained areas are used as cropland.

If drained, this soil is moderately suited to row crops. The wetness and the hazard of flooding are management concerns. They delay planting and limit the choice of crops. The flooding often damages winter grain crops. Keeping existing channels free of logs and debris reduces the hazard of flooding. If outlets are available, surface and subsurface drains are effective in removing ponded water and lowering the water table. In some areas, diversions are needed to intercept runoff from the uplands and terraces. Tilling only at the optimum moisture content helps to prevent cloddiness and compaction. Minimizing tillage, incorporating crop residue into the surface layer, and planting cover crops help to maintain tilth and protect the surface in areas that are subject to scouring by floodwater. Controlling weeds is difficult because weed seeds are carried in by floodwater.

This soil is only moderately suited to hay. Species that can tolerate wetness should be selected for planting. Such species commonly grow well, even during dry periods. Floodwater may damage hay plantings, especially in early spring.

This soil is suited to pasture grasses, such as bluegrass and reed canarygrass, but it is too wet for most legumes. Grasses grow well throughout the dry part of the summer. Grazing when the soil is wet and soft damages plant roots. This damage is difficult to prevent because the soil is wet much of the time. Rushes and cattails are common in ponded areas of pastures.

This soil is only moderately suited to timber production. The flooding and the wetness affect the planting, growth, and harvesting of trees. Native bottomland hardwoods that can tolerate flooding and wetness grow well. Selecting water-tolerant species for planting reduces the seedling mortality rate. Planting and logging should take place during dry periods or when the soil is frozen. The hazard of windthrow can be reduced by using harvesting methods that do not leave the remaining trees isolated or widely spaced. Removing vines and the less desirable trees and shrubs helps to control plant competition.

This soil is unsuited to use as a site for buildings or for septic tank absorption fields because of the flooding and the seasonal wetness. Local roads can be elevated above the flood level, but the fill should not block the flow of water. Excavated ponds are likely to hold water during wet periods, but only those that are fed by strong springs maintain their water level during dry periods. Floodwater may damage fills.

The land capability classification is IIIw. The pasture and hayland suitability group is C-3. The woodland ordination symbol is 4W.

MkD—Mertz very cherty silt loam, 15 to 35 percent slopes. This deep, moderately steep and steep, well drained soil is on hillsides and bluffs along Flint Ridge. Slopes are convex and uniform. They commonly range from 100 to 200 feet in length. Stones are common on the surface. Most areas of this soil are sinuous and range from 10 to 50 acres in size.

Typically, the surface layer is black, friable very cherty silt loam about 3 inches thick. The subsurface layer is dark grayish brown, friable very cherty silt loam about 4 inches thick. The subsoil is about 53 inches thick. The upper part is yellowish brown and strong brown, friable very cherty silt loam and cherty and very cherty silty clay loam. The lower part is strong brown, firm channery silty clay loam. In some areas the surface layer and the upper part of the subsoil are channery rather than cherty. In many areas on the lower parts of slopes, the subsoil has fewer fragments of flint.

Included with this soil in mapping are small areas of Frankstown Variant, Westmoreland, Rigley, and Coshocton soils. Frankstown Variant soils are moderately deep over bedrock and have a stony surface layer. Westmoreland and Rigley soils are in areas that have sandstone bedrock. The moderately well drained Coshocton soils are along the lower edge of slopes. Included soils make up about 30 percent of most delineations.

Permeability is moderately slow in the Mertz soil. Runoff is very rapid. Available water capacity is moderate. In cultivated areas the content of organic matter is moderately low in the surface layer. The root zone is deep. The potential for frost action is moderate. The capacity to store and release plant nutrients is low.

Most areas are wooded. A few areas are used as pasture.

This soil is generally unsuited to cultivated crops and hay because of the slope, a very severe hazard of erosion, and stones on the surface that interfere with the use of equipment.

This soil is poorly suited to pasture because of the slope and the stones on the surface. A wide variety of forage plants can grow well, but seeding them is difficult. Seeding companion crops, adding mulch, or using no-till seeding methods can reduce the hazard of erosion. Erosion can be severe in overgrazed pastures.

This soil is only moderately suited to timber production. The aspect of the slope and the coarse fragments affect the planting and growth of trees. Coves and north- and east-facing slopes are the best woodland sites. They have cooler temperatures and more available water than other sites because they are less exposed to the sun and prevailing winds. The slope limits the use of planting and logging equipment. Establishing roads and skid trails on the contour, establishing water bars, and maintaining a vegetative cover help to control erosion. Where roads and trails cross channels, adding stones helps to prevent gullying. Using seedlings that have been transplanted once or adding mulch can reduce the seedling mortality rate on south-facing slopes.

This soil is poorly suited to use as a site for buildings because of the slope. Controlling runoff and erosion is a management concern on construction sites. Maintaining a vegetative cover on the surface helps to control runoff and reduces the hazard of erosion. Establishing access roads or trails on the contour also helps to control runoff and erosion. Designing buildings so that they conform to the natural contour of the land reduces the need for excavation and land shaping.

This soil is poorly suited to use as a site for septic tank absorption fields because of the slope and the restricted permeability. Installing leach lines on the contour helps to prevent the surfacing of effluent. Enlarging the field helps to overcome the restricted permeability.

The potential for developing ponds in areas of this soil is very limited.

The land capability classification is VIe. The pasture and hayland suitability group is A-3. The woodland ordination symbol is 4F.

MrB—Morristown shaly silty clay loam, 1 to 15 percent slopes. This deep, nearly level to strongly sloping, well drained soil is on ridgetops and benches of mine spoil in areas that have been surface-mined for coal. Most areas have been graded, but soil material has not been added. The underlying material is a mixture of rock fragments and partially weathered fine earth material that was in or below the profile of the original soil before mining. The rock fragments are mostly limestone and shale but include small amounts of siltstone, sandstone, and black, carbonaceous shale. Slopes are smooth. Small, shallow gullies are in some areas. Many stones are on the surface in some areas. Most areas are long and narrow or are circular. They range from 5 to 100 acres in size.

Typically, the surface layer is brown shaly silty clay loam about 5 inches thick. The underlying material to a depth of 60 inches or more is light olive brown, firm very channery silty clay loam that contains many stones and boulders. Ungraded highwalls of shale and limestone bedrock are on the margin of some areas.

Included with this soil in mapping are Bethesda soils. These soils are in small areas where black shale is mixed with the mine spoil. They are more acid than the Morristown soil. Also included are small ponded areas in depressions and hollows. Included areas make up about 20 percent of most delineations.

Permeability is moderately slow in the Morristown soil. Runoff is medium. Available water capacity is low. The content of organic matter is very low in the surface layer. The depth of the root zone varies because of differences in the density of the underlying material. The capacity to store and release plant nutrients is low.

The shrink-swell potential and the potential for frost action are moderate.

Areas of this soil are used as habitat for wildlife, especially white-tailed deer, beaver, and Canada geese. Most areas support trees or shrubs, mainly black locust, silver maple, black oak, yellow-poplar, and European alder. Some areas support grasses and legumes.

This soil is generally unsuited to cultivated crops and hay because of droughtiness and a restricted rooting depth.

This soil is poorly suited to pasture. Forage production is low during periods of low rainfall because of the limited available water capacity. The soil remains soft until late spring. Grazing when the soil is soft can cause root damage and excessive compaction. If the soil is cultivated, the hazard of erosion is moderate. Seeding cover crops or companion crops, adding mulch, or using no-till seeding methods can reduce the hazard of erosion. Companion crops, however, compete with forage plants for the limited supply of moisture. The content of nitrogen and phosphorus is generally low, and the content of potassium is medium. Water for livestock is not available in many areas.

This soil is only moderately suited to timber production. Coarse fragments affect the planting and growth of trees. Species that can tolerate droughty, alkaline conditions should be selected for planting. Maintaining a cover of grasses and legumes helps to control erosion until the trees become established, but these plants compete with seedlings for moisture. Using inoculated seedlings that have been transplanted once and adding mulch around the seedlings reduce the seedling mortality rate. The stones on the surface limit the use of planting and logging equipment.

This soil is poorly suited to use as a site for buildings or for septic tank absorption fields. Uneven settlement, the content of coarse fragments, and the restricted permeability are the main limitations. Buildings should not be constructed until the process of settling is complete. The length of time required for settling varies. Areas that are deeper over bedrock generally require longer periods of time to settle. Buried trees and woody debris are in a few areas that were formerly wooded. These areas should not be used as construction sites or for septic tank absorption fields because of the hazard of future subsidence as the wood decays. Using a very large or double field helps to overcome the restricted permeability on sites for septic tank absorption fields. The larger stones should be removed before backfilling the leach lines.

There is some potential for excavated ponds, but careful onsite investigation is needed to determine the nature of the underlying material.

The land capability classification is VIs. The pasture and hayland suitability group is E-3. No woodland ordination symbol is assigned.

MrD—Morristown shaly silty clay loam, 15 to 25 percent slopes. This deep, moderately steep, well drained soil is in areas of mine spoil on hillsides that have been surface-mined for coal. The mine spoil has been graded and is 10 to 100 feet thick. Soil material has not been added. The underlying material is a mixture of rock fragments and partially weathered fine earth material that was in or below the profile of the original soil prior to mining. The rock fragments are mostly limestone and shale, but a few are siltstone, sandstone, and black, carbonaceous shale. Many stones are on the surface and in the surface layer. The microrelief is irregular, and deep gullies dissect some areas. Most areas are oblong and range from 5 to 80 acres in size.

Typically, the surface layer is brown shaly silty clay loam about 5 inches thick. The underlying material to a depth of more than 72 inches is light olive brown, firm very channery silty clay loam. The content of stones and boulders increases with increasing depth.

Included with this soil in mapping are Bethesda soils. These soils are in areas where black shale is mixed with mine spoil. They are more acid than the Morristown soil. Also included are ponded areas in depressions and hollows and areas of ungraded highwalls of shale and limestone bedrock. Included areas make up about 25 percent of most delineations.

Permeability is moderately slow in the Morristown soil. Runoff is very rapid. Available water capacity is low. The content of organic matter is very low in the surface layer. The depth of the root zone varies because of differences in the density of the underlying material. The capacity to store and release plant nutrients is low. The potential for frost action and the shrink-swell potential are moderate.

Areas of this soil are used as habitat for wildlife, including white-tailed deer, beaver, and Canada geese. Most areas support trees and shrubs, mainly black locust, silver maple, black oak, yellow-poplar, and European alder. Some areas support grasses and legumes.

This soil is generally unsuited to cultivated crops and hay because of droughtiness, the hazard of erosion, and the irregular slopes.

This soil is poorly suited to pasture. It is droughty and does not produce much forage during periods of low rainfall. The soil remains soft until late spring. Grazing when the soil is soft can damage plant roots and cause excessive compaction. If the soil is cultivated, the hazard of erosion is severe. Seeding cover crops or companion crops, adding mulch, or using no-till seeding methods can reduce the hazard of erosion. Companion crops, however, compete with forage plants for the limited moisture supply. The content of nitrogen and phosphorus is generally low, and the content of potassium is medium. Water for livestock is not available in many areas.

This soil is moderately suited to timber production. The aspect of the slope and the coarse fragments affect the planting and growth of trees. Coves and north- and east-facing slopes are the best woodland sites. They have cooler temperatures and more available water than other sites because they are less exposed to the sun and prevailing winds. Species that can tolerate the droughty, alkaline conditions should be selected for planting. Maintaining a cover of grasses and legumes helps to control erosion until the trees become established, but these plants compete with the seedlings for moisture. Using inoculated seedlings that have been transplanted once and mulching around the seedlings can reduce the seedling mortality rate on south-facing slopes. The slope and the stones on the surface limit the use of planting and logging equipment. Establishing roads and skid trails on the contour helps to control erosion. Establishing water bars and maintaining a vegetative cover also help to control erosion.

This soil is poorly suited to use as a site for buildings and is generally unsuited to use as a site for septic tank absorption fields because of the slope, the restricted permeability, the susceptibility to hillside slippage, and uneven settlement. Buildings should not be constructed until the process of settling is complete. The length of time required for settling varies. Areas that are deeper over bedrock usually require longer periods of time for settlement. Buried trees and woody debris are in a few areas that were formerly wooded. These areas should not be used as construction sites or for septic tank absorption fields because of the hazard of future subsidence as the wood decays. Making cuts on building sites may result in slippage.

The potential for pond sites in areas of this soil is extremely variable. Careful onsite investigation is needed to determine the nature of the underlying material.

The land capability classification is VIs. The pasture and hayland suitability group is E-3. No woodland ordination symbol is assigned.

MrF—Morristown shaly silty clay loam, 25 to 70 percent slopes. This deep, steep and very steep, well drained soil is on ungraded mine spoil ridges and trenches in areas that have been surface-mined for coal or limestone. The underlying material is a mixture of rock fragments and partially weathered fine earth material that was in or below the profile of the original soil. Rock fragments are mostly limestone and shale, but some are siltstone, sandstone, and black, carbonaceous shale. A highwall of exposed bedrock and a deep, water-filled trench are along the upper edge of many areas. Large gullies are in some areas. There are many stones on the surface. Most areas of this soil are long and narrow and range from 10 to 100 acres in size.

Typically, the surface layer is yellowish brown, friable shaly silty clay loam about 5 inches thick. The underlying material to a depth of 60 inches or more is dark gray and gray, firm channery and very channery silty clay loam and clay loam. Some areas between trenches are less sloping.

Included with this soil in mapping are small areas of Bethesda soils. These soils are acid throughout. Also included are small, shallow ponds. Included areas make up about 15 percent of most delineations.

Permeability is moderately slow in the Morristown soil. Runoff is very rapid. Available water capacity is low because of the high content of coarse fragments. The content of organic matter is very low in the surface layer. The root zone is shallow or moderately deep, depending on the density of the underlying material. The capacity to store and release plant nutrients is low. The shrink-swell potential and the potential for frost action are moderate.

Most areas support trees that were planted after mining activities ended.

This soil is generally unsuited to cultivated crops, hay, and pasture because of the slope, a very severe hazard of erosion, and droughtiness. Maintaining a permanent plant cover is the best means of controlling erosion.

This soil is moderately suited to timber production. The aspect of the slope and the coarse fragments affect the planting and growth of trees. Coves and north- and east-facing slopes are the best woodland sites. They have cooler temperatures and more available water than other sites because they are less exposed to the sun and prevailing winds. Species that can tolerate droughty, alkaline conditions should be selected for planting. Maintaining a cover of grasses and legumes helps to control erosion until the trees become established. Using inoculated seedlings that have been transplanted once and mulching around the seedlings reduce the seedling mortality rate on south-facing slopes. The slope and the stones on the surface limit the use of planting and logging equipment. Establishing roads and skid trails on the contour helps to control erosion. Establishing water bars and maintaining a vegetative cover also help to control erosion.

This soil is unsuited to use as a site for buildings or for septic tank absorption fields because of uneven settlement, the slope, the restricted permeability, and the susceptibility to hillside slippage. Cutting and filling on building sites increase the hazard of hillside slippage. Nearby areas of unmined soils are better sites for buildings. If the soil is used as a site for septic tank absorption fields, excessive downslope seepage of effluent is likely.

The slope limits the use of equipment needed to build ponds. Some ponds were created by mining activities in areas of this soil.

The land capability classification is VIIe. The pasture and hayland suitability group is H-1. No woodland ordination symbol is assigned.

MsB—Morristown silty clay loam, 1 to 8 percent slopes. This deep, nearly level and gently sloping, well drained soil is on ridgetops and benches of graded mine spoil in reclaimed areas that were surface-mined for coal or limestone. The surface in these areas has been graded to the original contour and blanketed with a layer of material derived from natural soils. The underlying material is a mixture of rock fragments and partially weathered fine earth material that was in or below the underlying material of the original soil. Rock fragments are mostly subrounded limestone and shale, but some are siltstone, sandstone, and coal. The wider areas of this soil are nearly level. Slopes are long and smooth. Most areas are oblong and range from 3 to 50 acres in size.

Typically, the surface layer is dark brown, firm silty clay loam about 8 inches thick. The underlying material to a depth of 60 inches or more is light gray, very firm channery or very channery silty clay loam and very channery silt loam. The content of coarse fragments of limestone, shale, siltstone, sandstone, and coal in the underlying material ranges from 15 to 70 percent. In some areas reaction is acid. Eroded areas where numerous rills and small gullies have formed are common. In places the surface layer is friable silt loam and is easier to till.

Included with this soil in mapping are poorly drained areas that support wetland vegetation and a few areas that have not been reclaimed after mining and that have a surface layer of channery clay loam or shaly silty clay loam. Also included are areas where the surface has been covered with 12 to 24 inches of loamy soil material. These areas have a higher available water capacity than the Morristown soil and are more productive. Included areas make up about 20 percent of most delineations.

Permeability is moderately slow in the Morristown soil. Runoff is medium or rapid. Available water capacity is low because the content of coarse fragments is high and the underlying material is compact. The content of organic matter is low in the surface layer. The root zone is moderately deep. It is limited by stones and dense layers in the underlying material. The capacity to store and release plant nutrients is moderate or low. The potential for frost action and the shrink-swell potential are moderate.

Most areas support grasses and legumes, but only a small acreage is grazed or harvested for hay.

This soil is moderately suited to cultivated crops. Droughtiness, erosion, tilth, and the content of organic matter are management concerns. The hazard of erosion is moderate in cultivated areas. Using a system of conservation tillage, such as no-till farming, that leaves crop residue on the surface, including grasses and legumes in the cropping system, stripcropping on the contour, and planting cover crops reduce the hazard of erosion. Using a conservation tillage system also improves tilth, increases the content of organic matter in the surface layer, and conserves moisture. The soil dries and warms up slowly in the spring because water moves slowly through the dense underlying material. Limiting fieldwork when the surface layer and subsoil are too wet helps to minimize compaction. Reclamation activities that were conducted under wet conditions have compacted the surface layer in many areas. Surface and subsurface drains are moderately effective in reducing wetness in scattered low or seepy areas.

This soil is only moderately suited to hay and pasture. Species that can tolerate droughtiness are the best suited. The soil is droughty because of the thin surface layer and the compact, channery underlying material. The soil remains soft until late spring. Grazing when the soil is soft can damage plant roots and cause compaction. Forage production is low during dry periods. If the soil is cultivated, the hazard of erosion is moderate. Seeding cover crops or companion crops, adding mulch, or using no-till seeding methods reduces the hazard of erosion. Companion crops, however, compete with forage plants for the limited supply of moisture.

This soil is only moderately suited to timber production. The coarse fragments affect the planting and growth of trees. Species that can tolerate droughty, alkaline conditions should be selected for planting. Maintaining a cover of grasses and legumes helps to control erosion until the trees become established. Using inoculated seedlings that have been transplanted once and mulching around the seedlings reduce the seedling mortality rate.

This soil is only moderately suited to use as a site for buildings and is generally unsuited to use as a site for septic tank absorption fields. Uneven settlement is likely for several years after reclamation. Construction should be delayed until the settling process is complete. Removing as little vegetation as possible, mulching, and establishing a temporary plant cover help to control erosion on construction sites. The shrink-swell potential is a limitation on sites for dwellings. Backfilling around foundations with granular material that has a low shrink-swell potential and supporting the walls with a large spread footing help to overcome this limitation. The restricted permeability and uneven settlement are severe limitations on sites for septic tank absorption fields.

There are few natural pond sites, and the watershed area is limited for excavated ponds. The ability of the underlying mine spoil to hold water varies considerably from place to place. Onsite investigation is needed.

The land capability classification is IIIs. The pasture and hayland suitability group is B-4. No woodland ordination symbol is assigned.

MsC—Morristown silty clay loam, 8 to 15 percent slopes. This deep, strongly sloping, well drained soil is on graded mine spoil on ridgetops and benches in reclaimed areas that were surface-mined for coal. The surface in these areas has been graded to the original contour and blanketed with a layer of material derived from natural soils. The underlying material is a mixture of rock fragments and partially weathered fine earth material that was in or below the profile of the original soil. The rock fragments are mostly limestone and shale, but some are siltstone, sandstone, and coal. A few stones are on the surface. Most drainageways have been lined with limestone rocks, but small gullies and rills are in some areas. Most areas are elongated and range from 20 to 150 acres in size.

Typically, the surface layer is yellowish brown, friable silty clay loam about 8 inches thick. The underlying material to a depth of 60 inches or more is dark grayish brown and very dark gray, firm very channery clay loam and extremely channery silty clay loam. Reaction is acid in places. Some areas are eroded and have rills and gullies.

Included with this soil in mapping are small areas of Bethesda soils. These soils are extremely acid. Also included are small areas that have not been reclaimed after mining and that have a channery or shaly surface layer. Included areas make up about 15 percent of most delineations.

Permeability is moderately slow in the Morristown soil. Runoff is rapid. Available water capacity is low because of the high content of coarse fragments in the underlying material. The content of organic matter is low in the surface layer, and tilth is fair. The depth of the root zone varies. It is limited by dense layers in the underlying material. The potential for frost action and the shrink-swell potential are moderate.

Most areas are used for grasses and legumes for hay and pasture. Some areas are used for small grain.

This soil is poorly suited to cultivated crops. Droughtiness, erosion, tilth, and the content of organic matter are management concerns. The hazard of erosion is severe in cultivated areas. Using a system of conservation tillage, such as no-till farming, that leaves crop residue on the surface helps to control erosion and conserves moisture. Including grasses and legumes in the cropping system, stripcropping on the contour, and planting cover crops also help to control erosion. The slow movement of water through the dense underlying material slows the drying and warming of the soil in spring. Limiting field operations when the soil is too wet can minimize compaction of the surface. Compaction is a problem in many areas where reclamation operations were performed under wet conditions.

This soil is only moderately suited to hay and pasture. Forage plants that can tolerate droughtiness are the best suited. Forage production is low during periods of low rainfall because of the limited available water capacity. The soil remains soft until late spring. Grazing when the surface is soft can damage plant roots and cause excessive compaction. If the soil is cultivated, the hazard of erosion is moderate. Seeding cover crops or companion crops, adding mulch, or using no-till seeding methods reduces the hazard of erosion. Companion crops, however, compete with forage plants for the limited moisture supply.

This soil is only moderately suited to timber production. The coarse fragments affect the planting and growth of trees. Species that can tolerate droughty, alkaline conditions should be selected for planting. Maintaining a cover of grasses and legumes helps to control erosion until the trees become established. Using inoculated seedlings that have been transplanted once and mulching around the seedlings reduce the seedling mortality rate.

Uneven settlement is likely for several years after reclamation. After it has settled, the soil is moderately suited to use as a site for buildings. The thickness of the soil over bedrock and the hazard of erosion are important considerations. Removing as little vegetation as possible, adding mulch, and establishing a temporary plant cover help to minimize erosion on construction sites. Land shaping is needed in some areas. The shrink-swell potential is a limitation on sites for dwellings. Backfilling around foundations with material that has a low shrink-swell potential and supporting the walls with a large spread footing help to prevent the damage caused by shrinking and swelling.

This soil is generally unsuited to use as a site for septic tank absorption fields. Restricted permeability and unstable fill are severe limitations.

The potential for pond sites is extremely variable because of the mixed nature of the underlying material. Careful onsite investigation is needed. Fills constructed prior to the completion of the settling process are likely to crack.

The land capability classification is IVs. The pasture and hayland suitability group is B-4. No woodland ordination symbol is assigned.

MsD—Morristown silty clay loam, 15 to 25 percent slopes. This deep, moderately steep, well drained soil is on hillsides of graded mine spoil in reclaimed areas that were surface-mined for coal or limestone. The surface in these areas has been graded to the original contour and blanketed with a layer of material derived from natural soils. The underlying material is a mixture of rock fragments and partially weathered fine earth material that was in or below the profile of the original soil. The rock fragments are mainly subrounded limestone and shale, but some are siltstone, sandstone, and coal. Slopes are dominantly long, smooth, and convex. A few gullies and rills have formed in areas where water flow is concentrated on the lower slopes. Most areas are oblong and range from 10 to 50 acres in size.

Typically, the surface layer is dark brown and dark yellowish brown, firm silty clay loam about 3 inches thick. The underlying material to a depth of 60 inches or more is mixed light yellowish brown and gray, firm channery or very channery loam and silty clay loam. The content of limestone, shale, siltstone, sandstone, and coal ranges from 15 to 70 percent in the underlying material.

Included with this soil in mapping are areas of the extremely acid Bethesda soils, areas that have a surface layer of channery silty clay loam, eroded areas where numerous gullies have formed or land slips have occurred, and areas that have a surface layer of silt loam. Also included are some areas where the surface has been covered with 12 to 24 inches of natural soil material. These areas have a higher available water capacity than the Morristown soil and are more productive. Included areas make up about 20 percent of most delineations.

Permeability is moderately slow in the Morristown soil. Runoff is very rapid. Available water capacity is low because the content of coarse fragments is high and the underlying material is compact. The root zone is generally moderately deep, but the depth is variable. Roots are restricted by compact layers in the underlying material. The potential for frost action and the shrink-swell potential are moderate.

Most areas support grasses and legumes, but only a small acreage is grazed or harvested for hay.

This soil is poorly suited to cultivated crops. Droughtiness, a very severe hazard of erosion, tilth, and the content of organic matter are management concerns. Using a system of conservation tillage, such as no-till farming, that leaves crop residue on the surface conserves moisture and helps to control erosion. Including grasses and legumes in the cropping system, stripcropping on the contour, and planting cover crops also reduce the hazard of erosion. The soil dries and warms up slowly in the spring because of the slow movement of water through the dense underlying material. Limiting fieldwork when the surface layer and subsoil are too wet helps to minimize compaction. Reclamation activities conducted under wet conditions have compacted the surface layer in many areas.

This soil is only moderately suited to hay and pasture. Forage plants that can tolerate droughtiness are the best suited. Commonly, forage production is low during periods of low rainfall because of the limited available water capacity. The soil remains soft until late spring. Grazing when the soil is soft can damage plant roots and cause excessive compaction. If the soil is cultivated, the hazard of erosion is moderate. Seeding cover crops or companion crops, adding mulch, or using no-till seeding methods reduces the hazard of erosion. Erosion can be severe in pastures if bare spots develop as a result of overgrazing.

This soil is only moderately suited to timber production. The aspect of the slope and the coarse fragments affect the planting and growth of trees. Coves and north- and east-facing slopes are the best woodland sites. They have cooler temperatures and more available water than other sites because they are less exposed to the sun and prevailing winds. Species that can tolerate droughty, alkaline conditions should be selected for planting. Maintaining a cover of grasses and legumes helps to control erosion until the trees become established. Using inoculated seedlings that have been transplanted once and mulching around the seedlings reduce the seedling mortality rate on south-facing slopes. The slope limits the use of planting and logging equipment. Establishing roads and skid trails on the contour helps to control erosion. Establishing water bars and maintaining a vegetative cover also help to control erosion.

This soil is poorly suited to use as a site for buildings. The slope and uneven settlement are management concerns. Construction should be delayed until the settling process is complete. Making cuts to develop a building site on the moderately steep slopes can result in slippage. Some building designs require less cutting and filling. The soil is unsuited to use as a site for septic tank absorption fields because of the restricted permeability. Unstable fill and the slope are also severe limitations.

The suitability of this soil for ponds varies considerably because of the mixed nature of the underlying material. Careful onsite investigation is needed.

The land capability classification is IVs. The pasture and hayland suitability group is B-4. No woodland ordination symbol is assigned.

MsE—Morristown silty clay loam, 25 to 50 percent slopes. This deep, steep and very steep, well drained soil is on hillsides of graded mine spoil in reclaimed areas that were surface-mined for coal. The surface in these areas has been graded and blanketed with a layer of material derived from natural soils. Reclamation has covered the highwall. The underlying material is a mixture of rock fragments and partially weathered fine earth material that was in the profile of the original soil. The rock fragments are mostly subrounded siltstone, limestone, and shale, but some are sandstone and coal. Slopes are long and smooth. Most areas are fan shaped and range from 3 to 50 acres in size.

Typically, the surface layer is mixed brown, dark brown, yellowish brown, and dark yellowish brown, firm silty clay loam about 6 inches thick. The underlying material to a depth of 60 inches or more is mixed yellowish brown and dark gray, firm channery and very channery silty clay loam. The content of limestone, shale, siltstone, sandstone, and carbonaceous shale fragments in the underlying material ranges from 25 to 70 percent.

Included with this soil in mapping are small areas of the acid Bethesda soils. Also included are small areas that have a surface layer of channery or shaly silty clay loam and eroded areas that have numerous rills, small gullies, or landslides. Included areas make up about 20 percent of most delineations.

Permeability is moderately slow in the Morristown soil. Runoff is very rapid. Available water capacity is low because the content of coarse fragments is high and the underlying material is very compact in places. The surface layer is sticky when wet and has a low content of organic matter. The root zone is generally moderately deep, but the depth is variable. It is limited by dense zones in the underlying material. The shrink-swell potential and the potential for frost action are moderate.

Most areas support grasses and legumes, but only a small acreage is grazed.

This soil is unsuited to cultivated crops because of the slope and a very severe hazard of erosion. The slope restricts the use of most farm equipment. Maintaining a permanent plant cover is the best means of controlling erosion.

This soil is poorly suited to hay and pasture. Forage plants that can tolerate droughtiness are the best suited. Forage production is low during dry periods. The slope limits the use of equipment. The soil remains soft until late spring. Grazing when the soil is soft can damage plant roots and cause excessive compaction. If the soil is cultivated, the hazard of erosion is very severe. Seeding cover crops or companion crops, adding mulch, or using no-till seeding methods reduces the hazard of erosion.

This soil is only moderately suited to timber production. The aspect of the slope and the coarse fragments affect the planting and growth of trees. Coves and north- and east-facing slopes are the best woodland sites. They have cooler temperatures and more available water than other sites because they are less exposed to the sun and prevailing winds. Species that can tolerate droughty, alkaline conditions should be selected for planting. Maintaining a cover of grasses and legumes helps to control erosion until the trees become established. Using inoculated seedlings that have been transplanted once and mulching around the seedlings reduce the seedling mortality rate, especially on south-facing slopes. The slope limits the use of planting and logging equipment. Establishing roads and skid trails on the contour helps to control erosion. Establishing water bars and maintaining a vegetative cover also help to control erosion.

This soil is generally unsuited to use as a site for buildings because of uneven settlement, the slope, and the hazard of landslides. It is generally unsuited to use as a site for septic tank absorption fields because of the slope, unstable fill, and the restricted permeability.

There is little potential for developing ponds in areas of this soil. Any excavation can result in slippage and damage to the fill.

The land capability classification is VIe. The pasture and hayland suitability group is E-2. No woodland ordination symbol is assigned.

Ne—Newark silt loam, frequently flooded. This deep, nearly level, somewhat poorly drained soil is on flood plains. It makes up the entire flood plain along the smaller streams or is in long, narrow areas adjacent to sloping uplands or terraces on the wider flood plains. Some areas are dissected by old stream channels and small drainage ditches. Flooding is brief and usually occurs during the dormant season, but flash floods may occur during the growing season following intense local thunderstorms. Most areas range from 5 to 50 acres in size. Slopes range from 0 to 3 percent.

Typically, the surface layer is dark grayish brown, very friable silt loam about 11 inches thick. The subsoil is brown and grayish brown, mottled, very friable silt loam about 21 inches thick. The underlying material to a depth of 60 inches or more is dark yellowish brown and light brownish gray, friable silt loam. In some areas the surface layer is loam or silty clay loam. In many places the content of clay is lower. Some areas on low terraces are subject to rare flooding.

Included with this soil in mapping are small areas of Nolin, Chagrin, Lindside, Lobdell, and Melvin soils. The well drained Nolin and Chagrin soils and the moderately well drained Lindside and Lobdell soils are on natural levees near stream channels and on other slightly elevated parts of flood plains. The poorly drained Melvin soils are in the lower areas that are frequently flooded. Also included are areas in the flood pools of the Dillon Lake dam and the Wills Creek dam that are subject to controlled flooding. Included areas make up about 20 percent of most delineations.

Permeability is moderate in the Newark soil. Runoff is slow. Available water capacity is high. The content of organic matter is moderate. The root zone is deep, but it is limited by a seasonal high water table in the upper part of the subsoil in winter and spring and during other extended wet periods. The capacity to store and release plant nutrients is moderate. The potential for frost action is high.

Some areas in the wider valleys are used as cropland. Most areas in the narrower valleys are used as pasture or woodland. The suitability of this soil for a particular use depends on the extent of drainage and the frequency of flooding during the growing season. Areas that are not drained are suited to use as habitat for wetland wildlife.

If drained and protected from flooding, this soil is well suited to cultivated crops. Wetness and the hazard of flooding are management concerns. Planting is delayed in some years. Winter grains are most likely to be damaged by flooding. Surface and subsurface drains can remove surface water after flooding and can lower the seasonal high water table, but some areas on narrow flood plains do not have suitable outlets. In some places, diversions can be used to intercept runoff from the adjacent higher areas. The hazard of flooding can be reduced by keeping channels free of logs and debris. Using tillage methods that leave the surface rough or ridged and partially covered by crop residue helps to control runoff, increases the rate of water infiltration, and hastens drying. In adequately drained areas, the soil is suited to no-till planting. Controlling weeds is difficult because weed seeds are carried in by floodwater.

If drained, this soil is well suited to hay. Drained areas are suited to most of the commonly grown species. Only species that can tolerate wetness should be seeded in undrained areas. Areas that have been recently seeded to hay can be damaged by floodwater, especially where a finely tilled seedbed has been prepared. In such areas, plants seeded in midsummer are less likely to be damaged than those seeded in early spring.

This soil is only moderately suited to pasture. Areas that have not been drained are suited to bluegrass pasture. Forage production can be improved by seeding grass-legume mixtures that can tolerate wetness. Deferred grazing during wet seasons can prevent compaction of the surface layer and damage to plant roots. The brief periods of flooding during the growing season reduce the quality of forage.

This soil is well suited to timber production. The flooding and the wetness affect the planting, growth, and harvesting of trees. Native bottom-land hardwoods that tolerate flooding and wetness grow well. Selecting water-tolerant species for planting reduces the seedling mortality rate. Because the flooding is usually brief, most management activities can be performed during periods when the soil is not flooded. Planting and logging should take place during dry periods or when the soil is frozen. The hazard of windthrow can be reduced by using harvesting methods that do not leave the remaining trees isolated or widely spaced. Removing vines and the less desirable trees and shrubs helps to control plant competition.

This soil is generally unsuited to building site development or septic tank absorption fields because of the flooding. The seasonal wetness also is a limitation. Roads can be constructed on fill above the level of flooding, but the fill should not block the flow of floodwater. Culverts under local roads and streets should have the capacity to carry the peak flow during flash floods.

Areas in narrow valleys can be used as sites for dams to create artificial lakes or ponds. The soil is not stable enough to support large earthen fills. Deep core trenches commonly are needed. Dams and spillways should be designed to handle the flow from the entire upstream watershed. Generally, a simple earthen dam cannot handle the flow. Ponds excavated away from the stream channel are unlikely to hold water and are subject to flood damage.

Areas of this soil that have not been drained are recognized as farmland of local importance. The land capability classification is IIw. The pasture and hayland suitability group is C-3. The woodland ordination symbol is 5W.

No—Nolin silt loam, occasionally flooded. This deep, nearly level, well drained soil is on flood plains along the major streams. Most areas are cut by meandering channels. The soil receives stream overflow mainly during the dormant season or after periods of prolonged heavy rainfall. Slopes range from 0 to 2 percent. Most areas are crescent shaped and range from 10 to 100 acres in size.

Typically, the surface layer is brown, friable silt loam about 7 inches thick. The underlying material to a depth of 60 inches or more is brown and dark yellowish brown, friable silt loam. Some areas that have an increased rate of runoff because of strip mining or other changes are frequently flooded. In elevated areas the soil has layers of loam and fine sandy loam and is subject to rare flooding.

Included with this soil in mapping are areas of Newark, Melvin, and Lobdell soils. The somewhat poorly drained Newark soils are in slight depressions or in areas where tributary streams enter the flood plain. The poorly drained Melvin soils are in old channel meanders. Lobdell soils are on small alluvial fans that are subject to rare flooding. Also included are areas in the flood pool of the Dillon Lake dam that are subject to controlled flooding. Included areas make up about 20 percent of most delineations.

Permeability is moderate in the Nolin soil. Runoff is slow. Available water capacity is very high. The content of organic matter in the surface layer is moderate. The root zone is deep. The capacity to store and release plant nutrients is moderate. A seasonal high water table is at a depth of 3 to 6 feet during extended wet periods. The potential for frost action is high.

Most of the broader areas are used as cropland. The narrower valleys are used as pasture or woodland.

This soil is well suited to corn and soybeans. Winter grain crops are more likely to be damaged by flooding than other crops. If the soil is cultivated, surface crusting after rains reduces the rate of water infiltration and retards the emergence of seedlings. Shallow cultivation of intertilled crops, however, breaks up the crust. Using a system of conservation tillage, such as no-till farming, that leaves crop residue on the surface conserves moisture and increases the rate of water infiltration. Banded or split applications of fertilizer minimize the loss of nutrients, especially nitrogen, and help to prevent the pollution of ground water. Limiting fieldwork when the surface layer and subsoil are too wet helps to minimize compaction. In a few areas, land grading allows surface water to drain faster. Keeping stream channels free of obstructions, such as logjams, reduces the hazard of flooding. Small levees have been constructed in some areas to help prevent flooding. Streambank erosion is a major source of sediments that pollute the water. Streambanks can be stabilized by shaping, by planting shrubs, and by placing stone riprap in some places. Controlling weeds is a concern because weed seeds are carried in by floodwater. Winter cover crops protect the soil from scouring. In some areas, grass-lined floodwater channels are needed to handle peak flow and minimize scouring. Diversions at the base of slope breaks to the uplands or terraces minimize the damage caused by flash flooding.

This soil is well suited to hay. A wide variety of species can be planted. In finely tilled seedbeds, surface crusting may delay the emergence of seedlings. Plants seeded in midsummer are less likely to be damaged by flooding than those seeded in early spring. Planting a companion crop of small grain minimizes the damage to young seedlings caused by flooding. Including legumes in the seeding mixture provides nitrogen for subsequent row crops.

This soil is well suited to pasture. A wide variety of forage plants can thrive on this soil. The brief periods of flooding during the growing season reduce the quality of forage.

This soil is well suited to timber production. The flooding affects the planting, growth, and harvesting of trees. Native bottom-land hardwoods that can tolerate flooding grow well. Because the flooding is usually brief, most management activities can be performed during periods when the soil is not flooded. Removing vines and the less desirable trees and shrubs helps to control plant competition.

This soil is generally not suited to use as a site for buildings because of the flooding. Some structures and local roads can be elevated above flood levels, but extensive filling can partially block the natural floodway and increase the level of flooding upstream.

This soil is generally unsuited to septic tank absorption fields because of the flooding. The surfacing of effluent during periods of flooding is likely to cause pollution of streams. Excavated ponds are unlikely to hold water and are subject to flood damage.

The land capability classification is IIw. The pasture and hayland suitability group is A-5. The woodland ordination symbol is 5A.

OmB—Omulga silt loam, 2 to 6 percent slopes. This deep, gently sloping, moderately well drained soil is on terraces of valley fill. Slopes are typically smooth and convex. Most areas range from 3 to 25 acres in size.

Typically, the surface layer is brown, friable silt loam about 8 inches thick. The subsoil is about 50 inches thick. The upper part is yellowish brown, firm silt loam. It is mottled at a depth of more than 21 inches. The next part is a fragipan of yellowish brown, very firm and brittle silt loam. The lower part of the subsoil is yellowish brown, firm silty clay loam. The underlying material to a depth of 66 inches or more is brown, mottled, firm silty clay. In some areas the content of coarse fragments in the subsoil is higher.

Included with this soil in mapping are areas of Fitchville and Glenford soils. These soils receive runoff and seepage water from adjacent higher soils. The somewhat poorly drained Fitchville soils commonly occur as narrow bands adjacent to the uplands. Glenford soils do not have a fragipan. Included soils make up about 20 percent of most delineations.

Permeability is moderate in the upper part of the subsoil in the Omulga soil. It is slow in the fragipan and moderately slow below the fragipan. Runoff is medium in cultivated areas. The root zone is only moderately deep because of the fragipan. Available water capacity in the root zone is low. A high water table is perched above the fragipan during wet periods. The content of organic matter is moderately low in the surface layer. The shrink-swell potential is moderate. The potential for frost action is high.

Most areas were farmed in the past. Some areas are still farmed, but many areas are now dominated by native trees, brush, and grasses. A few areas are used as building sites. Only a small acreage is wooded.

This soil is well suited to cultivated crops. The hazard of erosion is moderate in cultivated areas. If the soil is cultivated, surface crusting after rains reduces the rate of water infiltration and retards the emergence of seedlings. Using a system of conservation tillage, such as no-till farming, that leaves crop residue on the surface, including grasses and legumes in the cropping system, planting cover crops, tilling on the contour, and establishing grassed waterways can reduce the hazard of erosion. The soil dries and warms up slowly in the spring because the fragipan in the subsoil holds water in the upper part of the profile. Limiting fieldwork when the surface layer and subsoil are too wet helps to minimize compaction. Subsurface drains can reduce the wetness in scattered low areas.

This soil is well suited to hay and pasture. The roots of some species are restricted by the fragipan. Frost heave can damage deep-rooted legumes, especially in pure stands. Leaving a protective cover of vegetation on the surface in the fall or seeding a grass-legume mixture can minimize the damage caused by frost heave. If the soil is plowed, the hazard of erosion is moderate. Seeding companion crops, adding mulch, or using no-till seeding methods can reduce the hazard of erosion.

This soil is well suited to timber production. The fragipan restricts the roots of some trees. The soil has low strength when wet and cannot support heavy equipment. Spreading aggregate on haul roads or log landings helps to stabilize the surface. Using logging techniques that do not leave the remaining trees widely spaced can reduce the hazard of windthrow. Removing vines and the less desirable trees and shrubs helps to control plant competition.

This soil is only moderately suited to use as a site for buildings. The seasonal wetness and the shrink-swell potential are limitations. Installing drains around footings and coating exterior walls help to keep basements dry. Reinforcing foundation walls and footings helps to prevent the damage caused by shrinking and swelling.

This soil is poorly suited to septic tank absorption fields. The restricted permeability in the fragipan and the seasonal wetness are limitations. Perimeter drains can reduce the wetness by lowering the seasonal high water table. Enlarging the absorption area or installing a double absorption field system helps to prevent the surfacing of effluent.

The material in the upper part of the soil does not pack well and is poorly suited to use as fill for earthen dams. Areas of this soil have potential for use as sites for excavated ponds, but careful onsite investigation is needed to determine the nature of the underlying material.

The land capability classification is IIe. The pasture and hayland suitability group is F-3. The woodland ordination symbol is 4D.

OmC—Omulga silt loam, 6 to 15 percent slopes. This deep, strongly sloping, moderately well drained soil is on dissected terraces of valley fill at the base of the steeper hillsides. Slopes commonly range from 150 to 300 feet in length. Most areas are long and narrow and range from 5 to 10 acres in size.

Typically, the surface layer is dark gray and brown, friable silt loam about 7 inches thick. The subsoil is about 59 inches thick. The upper part, to a depth of about 30 inches, is yellowish brown, friable silt loam or silty clay loam. The lower part, to a depth of about 66 inches, is a fragipan of yellowish brown, mottled, very firm, brittle silty clay loam. The underlying material to a depth of 80 inches or more is yellowish brown, firm silty clay loam and silty clay. In some areas the subsoil has a higher content of coarse fragments. In places the underlying material is sandy loam. In some areas, the subsoil does not have a fragipan and permeability is less restricted.

Included with this soil in mapping are areas of the well drained Alford and Wellston soils. These soils do not have a fragipan. Also included are areas in the flood pools of the Dillon Lake dam and the Wills Creek dam that are subject to controlled flooding. Included areas make up about 20 percent of most delineations.

Permeability is moderate in the upper part of the subsoil in the Omulga soil. It is slow in the fragipan and moderately slow in the underlying material. Runoff is rapid. The rooting depth is generally restricted to the zone above the fragipan. Available water capacity is low in the root zone. The content of organic matter is low in the surface layer. The potential for frost action is high. The shrink-swell potential is moderate in the subsoil. The capacity to store and release plant nutrients is moderate. A seasonal high water table is perched above the fragipan in the winter and spring and during other extended wet periods. Hillside seepage is common in areas of this soil, especially on the lower parts of slopes.

Most areas are used for pasture or hay. A few areas are used for corn.

This soil is only moderately suited to cultivated crops. Erosion is the main management concern. The hazard of erosion is severe in cultivated areas. Improving soil fertility and conserving moisture also are management concerns. If the soil is cultivated, surface crusting after rains reduces the rate of water infiltration and retards the emergence of seedlings. Using a system of conservation tillage, such as no-till farming, that leaves crop residue on the surface, including grasses and legumes in the cropping system, planting cover crops, tilling on the contour, and establishing grassed waterways can reduce the hazard of erosion. Limiting fieldwork when the surface layer and subsoil are too wet helps to minimize compaction. Using subsurface drains in seepy areas increases crop production in most years.

This soil is well suited to hay and pasture. The roots of some species are restricted by the fragipan. Frost heave can damage deep-rooted legumes, especially in pure stands. Leaving a protective cover of vegetation on the surface in the fall and including grasses in the seeding mixture can minimize the damage caused by frost heave. If the soil is plowed, the hazard of erosion is severe. Seeding companion crops, adding mulch, or using no-till seeding methods can reduce the hazard of erosion.

This soil is well suited to timber production. The fragipan restricts the roots of some trees. The soil has low strength when wet and cannot support heavy equipment. Spreading aggregate on haul roads or log landings helps to stabilize the surface. Using logging techniques that do not leave the remaining trees widely spaced can reduce the hazard of windthrow. Removing vines and the less desirable trees and shrubs helps to control plant competition.

This soil is only moderately suited to use as a site for buildings because of the slope, the wetness, and the shrink-swell potential. Increased runoff and erosion are management concerns on construction sites. Maintaining a vegetative cover and reseeding areas where vegetation has been removed help to control runoff and reduce the hazard of erosion. Reinforcing foundation walls and footings helps to prevent the damage caused by shrinking and swelling. Installing drains around footings and coating subgrade walls help to prevent wet basements. Backfilling the drains with gravel helps to intercept water seeping along the top of the fragipan. Surface water from adjacent slopes should be diverted away from the building site.

This soil is poorly suited to use as a site for septic tank absorption fields because of the restricted permeability in the fragipan and the seasonal wetness. Perimeter drains can reduce the seasonal wetness by lowering the water table. Enlarging the absorption area or installing a double absorption field system helps to prevent the surfacing of effluent. Installing the leach lines on the contour reduces the need for deep excavations and results in a more uniform distribution of effluent.

The material in the upper part of the soil does not pack well and is poor fill for dams. There is some potential for developing ponds in draws that cross areas of this soil, but careful onsite investigation is needed. In most cases, fill should be brought in from another area.

This soil is recognized as farmland of local importance. The land capability classification is IIIe. The pasture and hayland suitability group is F-3. The woodland ordination symbol is 4D.

RaB—Rawson silt loam, 2 to 6 percent slopes. This deep, gently sloping, moderately well drained soil is on terraces in the valleys of former glacial lakes. It is on the margin of terraces in areas where runoff from the adjoining uplands forms small alluvial fans. Individual areas are round or long and narrow and range from 5 to 30 acres in size.

Typically, the surface layer is brown, friable silt loam about 10 inches thick. The subsoil is about 33 inches thick. The upper 7 inches is yellowish brown, firm silt loam. The next part is brown, mottled, very firm loam and friable sandy loam. The lower part is brown, mottled, firm silty clay. The underlying material to a depth of 65 inches or more is brown, mottled, very firm silty clay. In many areas the surface layer is loam or gravelly loam. In some places the depth to the underlying material is greater. In some small areas, slopes are 8 to 12 percent and the soil is more gravelly and is better drained. In areas where intermittent streams from adjacent uplands emerge onto the terrace and overflow, the soil is subject to rare flooding.

Included with this soil in mapping are areas of Jimtown, Fitchville, Markland, Omulga, and Chili soils. The somewhat poorly drained Jimtown and Fitchville soils are in depressions. The well drained Chili soils are on the edges of the terraces. Markland and Omulga soils have less sand in the upper part of the subsoil than the Rawson soil. They are intermingled with the Rawson soil in some areas. Also included are areas in the flood pools of the Dillon Lake dam and the Wills Creek dam that are subject to controlled flooding. Included areas make up about 25 percent of most delineations.

Permeability is moderate in the upper part of the subsoil of the Rawson soil. It is slow or very slow in the lower part of the subsoil and in the underlying material. Runoff is medium. Available water capacity is moderate. The content of organic matter is moderate in the surface layer. The capacity to store and release plant nutrients also is moderate. A seasonal high water table is perched in the lower part of the subsoil during extended wet periods. The shrink-swell potential is moderate in the lower part of the subsoil and in the underlying material.

Most areas are used as cropland. Corn, wheat, and hay are commonly grown. Some areas are used as pasture.

This soil is well suited to cultivated crops, including specialty crops. Erosion, fertility, and the content of organic matter are the main management concerns. The hazard of erosion is moderate in cultivated areas. If the soil is cultivated, surface crusting after rains reduces the rate of water infiltration and retards the emergence of seedlings. Using a system of conservation tillage, such as no-till farming, that leaves crop residue on the surface, including grasses and legumes in the cropping system, planting cover crops, and tilling on the contour can reduce the hazard of erosion. Limiting fieldwork when the surface layer and subsoil are too wet helps to minimize compaction. Subsurface drains can reduce the wetness in scattered areas. Grassed waterways can be used to remove surface water in some areas.

This soil is well suited to hay and pasture. It is suited to a wide variety of forage plants. Some areas are too wet for alfalfa unless they are drained. Restricting grazing when the soil is wet helps to prevent compaction of the surface layer and damage to roots.

This soil is well suited to timber production. No major limitations affect the planting or growth of trees. The soil has low strength when wet and cannot support heavy equipment. Spreading aggregate on haul roads or log landings helps to stabilize the surface.

This soil is only moderately suited to use as a site for buildings. Because of the seasonal wetness, it is better suited to use as a site for houses without basements than to those with basements. Installing drains at the base of footings and coating exterior walls help to prevent wet basements. Reinforcing foundation walls and footings helps to prevent the damage caused by shrinking and swelling of the clayey underlying material.

This soil is only moderately suited to septic tank absorption fields. The wetness and the restricted permeability in the underlying material restrict the movement of effluent from the leach lines. Perimeter drains can reduce the wetness by lowering the water table. Enlarging the absorption area or installing a double absorption field system helps to overcome the restricted permeability.

This soil has some potential for use as a site for excavated ponds. The underlying material can hold water. The suitability of the material in the upper part of the soil varies. Onsite investigation is needed.

The land capability classification is IIe. The pasture and hayland suitability group is A-1. The woodland ordination symbol is 4A.

RfC—Rigley loam, 8 to 15 percent slopes. This deep, strongly sloping, well drained soil is on knolls or shoulder slopes on ridgetops. Individual areas generally are long and narrow and range mainly from 3 to 80 acres in size.

Typically, the surface layer is dark brown, friable loam about 10 inches thick. The subsoil is about 30 inches thick. The upper part is dark brown, friable loam, and the lower part is dark yellowish brown, friable sandy loam. The underlying material to a depth of 80 inches or more is very pale brown, friable sandy loam and loamy sand. In some areas the surface layer and the subsoil have a higher content of sandstone fragments. In places the surface layer is sandy loam. In some areas the soil is moderately deep. In places, the underlying material is more clayey and the soil is moderately well drained. Some areas are gently sloping.

Included with this soil in mapping are small areas of Berks, Gilpin, and Wellston soils. Berks soils are more channery than the Rigley soil, Gilpin soils are more clayey, and Wellston soils are more silty. Berks and Gilpin soils are moderately deep. Included soils make up about 20 percent of most delineations.

Permeability is moderately rapid in the Rigley soil. Runoff is medium or rapid. Available water capacity is moderate. The content of organic matter is moderately low in the surface layer. The root zone is deep. The capacity to store and release plant nutrients is low.

Many areas are used as cropland. Some areas are used as pasture.

This soil is only moderately suited to cultivated crops. Erosion and droughtiness are the main management concerns. The hazard of erosion is severe in cultivated areas. The soil dries rapidly and warms up early in the spring. Using a system of conservation tillage, such as no-till farming, that leaves crop residue on the surface helps to control erosion and conserves moisture. Including grasses and legumes in the cropping system, planting cover crops, tilling on the contour, stripcropping, and establishing grassed waterways also reduce the hazard of erosion. Limiting fieldwork when the surface layer and subsoil are too wet helps to minimize compaction. Banded or split applications of fertilizer minimize the loss of nutrients, especially nitrogen, and help to prevent the pollution of ground water.

This soil is well suited to hay and pasture. It is suited to a wide variety of forage plants. The early warming of the soil results in good spring pasture, but droughtiness limits production later in the growing season. If the soil is plowed, the hazard of erosion is moderate. Seeding companion crops, adding mulch, or using no-till seeding methods reduces the hazard of erosion.

This soil is well suited to timber production. No major limitations affect the planting, growth, or harvesting of trees. Species that can tolerate drought should be selected for planting.

This soil is well suited to use as a site for buildings. The slope is the main management concern. Designing buildings so that they conform to the natural contour of the land reduces the need for grading. Removing as little vegetation as possible, adding mulch, and establishing a temporary plant cover help to control erosion on construction sites. Constructing local roads and streets on the contour and seeding road cuts also help to control erosion. Stockpiling the surface soil and using it to blanket the surface during the final grading help to reestablish the plant cover.

This soil is only moderately suited to use as a site for septic tank absorption fields. The thickness of material that can provide an adequate filter is a management concern. The underlying material is a poor filter, and unfiltered effluent that reaches this sandy material could pollute ground water. Leach lines should be installed across the slope as close to the surface as possible. Caving is a hazard in excavations.

Ponds developed in areas of this soil are likely to have an excessive seepage rate.

This soil is recognized as farmland of local importance. The land capability classification is IIIe. The pasture and hayland suitability group is A-1. The woodland ordination symbol is 4A.

RgD—Rigley channery loam, 15 to 25 percent slopes. This deep, moderately steep, well drained soil is on upland hillsides and nose slopes. Some areas have common stones on the surface. Outcrops of bedrock are at the upper edge of some areas. Most areas are long and narrow and range from 5 to 50 acres in size.

Typically, the surface layer is dark grayish brown, friable channery loam about 6 inches thick. The subsoil is yellowish brown, very friable channery loam and channery sandy loam about 26 inches thick. The underlying material to a depth of 60 inches or more is yellowish brown and pale brown, very friable channery loamy sand. In some areas the subsoil has a higher content of sandstone fragments. In other areas the soil is moderately deep over sandstone bedrock. In some places the surface layer is sandy loam. Areas where the underlying material is clayey are moderately well drained.

Included with this soil in mapping are small areas of Berks, Gilpin, and Wellston soils. Berks soils are more channery than the Rigley soil, Gilpin soils are more clayey, and Wellston soils are more silty. Berks and Gilpin soils are moderately deep. Included soils make up about 20 percent of most delineations.

Permeability is moderately rapid in the Rigley soil. Runoff is rapid. Available water capacity is moderate. The content of organic matter is low in the surface layer. The root zone is deep. The capacity to store and release plant nutrients is low.

Most areas are used as pasture. Many areas are wooded. A few areas are used as cropland.

This soil is poorly suited to cultivated crops and hay. Fertility is low. Droughtiness, erosion, tilth, and the content of organic matter are management concerns. The hazard of erosion is very severe in cultivated areas. Using a system of conservation tillage, such as no-till farming, that leaves crop residue on the surface helps to control erosion and conserves moisture. Including grasses and legumes in the cropping system, stripcropping on the contour, and planting cover crops also help to control erosion. Maintaining a permanent plant cover is the best means of controlling erosion. Channers in the surface layer restrict the use of some tilling and harvesting machinery. Leaching of plant nutrients, especially nitrogen, is rapid. Banded or split applications of fertilizer minimize the loss of nutrients and help to prevent the pollution of ground water.

This soil is moderately suited to pasture. A wide variety of adapted forage plants can grow on this soil, but those that can tolerate droughtiness are the best suited. The early warming of the soil results in good spring pasture, but droughtiness limits production later in the growing season. If the soil is plowed, the hazard of erosion is severe. Seeding companion crops, adding mulch, or using no-till seeding methods reduces the hazard of erosion. In some areas, surface stones interfere with pasture improvement.

This soil is moderately suited to timber production.

The aspect of the slope affects the planting and growth of trees. Coves and north- and east-facing slopes are the best woodland sites. They have cooler temperatures and more available water than other sites because they are less exposed to the sun and prevailing winds. The slope limits the use of planting and logging equipment. Establishing roads and skid trails on the contour helps to control erosion. Establishing water bars and maintaining a vegetative cover also help to control erosion. Using seedlings that have been transplanted once or mulching can reduce the seedling mortality rate, especially on south-facing slopes.

This soil is only moderately suited to use as a site for buildings. The slope is the major management concern. Removing as little vegetation as possible, mulching, establishing a temporary plant cover on construction sites, constructing local roads and streets on the contour, and seeding road cuts help to control erosion. Stockpiling the surface soil and using it to blanket the surface during final grading help to reestablish the plant cover.

This soil is only moderately suited to septic tank absorption fields. The slope and the limited thickness of material that can provide an adequate filter are management concerns. The underlying material is a poor filter, and unfiltered effluent that reaches this sandy material could pollute ground water. Leach lines should be installed across the slope as close to the surface as possible. Caving is a hazard in excavations.

Ponds developed in areas of this soil are likely to have an excessive seepage rate.

The land capability classification is IVe. The pasture and hayland suitability group is A-2. The woodland ordination symbol is 4R on north aspects and 3R on south aspects.

RhE—Rigley-Coshocton complex, 25 to 40 percent slopes. These deep, steep soils are on dissected hillsides. The well drained Rigley soil is on bluffs, and the moderately well drained Coshocton soil is on concave benches in areas that have seeps and a perched water table. Areas of the Coshocton soil commonly are less sloping than areas of the Rigley soil. The two soils occur as belts that are associated with different types of bedrock. These belts are around hillsides or are in ravines at the head of small streams. Each belt is at a consistent elevation. Most areas of these soils range from 10 to 250 acres in size. They are about 40 percent Rigley soil and 35 percent Coshocton soil.

Typically, the surface layer of the Rigley soil is dark grayish brown, friable channery loam about 6 inches thick. The subsurface layer is yellowish brown, very friable channery loam about 6 inches thick. The subsoil is yellowish brown, very friable channery loam, channery sandy loam, and channery loamy sand about 36 inches thick. The underlying material to a depth of 60 inches or more is pale brown, very friable channery loamy sand. In some areas the subsoil has a higher content of sandstone fragments. In other areas the soil is moderately deep over sandstone bedrock. In places the surface layer is sandy loam. In some areas, the soil is moderately well drained and the underlying material is clayey. Some areas have a stony surface layer, and a few areas have a bouldery surface layer. In some places the subsoil has more clay. Slopes are more than 40 percent in areas along ravines.

Typically, the surface layer of the Coshocton soil is dark brown, friable silt loam about 3 inches thick. The subsurface layer is brown, friable silt loam about 3 inches thick. The subsoil is about 37 inches thick. The upper part is yellowish brown, friable channery silt loam. The lower part is light yellowish brown, mottled, firm very channery and extremely channery clay loam. The underlying material is yellowish brown, mottled shaly silty clay about 5 inches thick. Soft, thinly bedded shale bedrock is at a depth of about 48 inches. In some areas the upper part of the subsoil is loam or channery loam. A few areas are stony or bouldery.

Included with these soils in mapping are areas of Berks, Gilpin, Guernsey, Alford, and Glenford soils. The moderately deep Berks and Gilpin soils are on the upper parts of slopes. The moderately well drained Guernsey soils are on the lower slopes. They have more clay in the subsoil than the Rigley and Coshocton soils. Alford and Glenford soils are on the less sloping foot slopes in areas that have deep deposits of silt. Springs are common near the areas of contact between Rigley and Coshocton soils. Small seepy areas of poorly drained soils are common around the springs. Included areas make up 25 percent of most delineations.

Permeability is moderately rapid in the Rigley soil and is moderately slow or slow in the Coshocton soil. Runoff is rapid on both soils. Available water capacity is moderate. The content of organic matter is moderately low in the surface layer. The root zone is deep. The capacity to store and release plant nutrients is low in the Rigley soil and moderate in the Coshocton soil. The water table is in the lower part of the subsoil in the Coshocton soil during extended wet periods. The shrink-swell potential is moderate in the lower part of the Coshocton soil.

Most areas are wooded. Some areas are used as pasture. Some areas were formerly cultivated.

These soils are generally unsuited to cultivated crops or hay. Cultivation is impractical. The use of equipment is severely restricted by the slope, and the hazard of erosion is very severe. Maintaining a permanent plant cover is the best means of controlling erosion.

These soils are poorly suited to pasture. The slope and the channers on the surface interfere with pasture management practices. A wide variety of forage plants can grow on these soils. Frost heave in areas of the Coshocton soil can damage deep-rooted legumes, especially in pure stands. Leaving a protective cover of vegetation on the surface in the fall and seeding a grass-legume mixture can minimize the damage caused by frost heave. If the surface is tilled, the hazard of erosion is very severe. Seeding companion crops, adding mulch, or using no-till seeding methods reduces the hazard of erosion.

These soils are only moderately suited to timber production. The aspect of the slope affects the planting and growth of trees. Coves and north- and east-facing slopes are the best woodland sites. They have cooler temperatures and more available water than other sites because they are less exposed to the sun and prevailing winds. The Coshocton soil has low strength when wet and cannot support heavy equipment. Spreading aggregate on haul roads or log landings helps to stabilize the surface. The slope limits the use of planting and logging equipment. Establishing roads and skid trails on the contour helps to control erosion. Establishing water bars and maintaining a vegetative cover also help to control erosion. Using seedlings that have been transplanted once or adding mulch can reduce the seedling mortality rate on south-facing slopes. Removing vines and the less desirable trees and shrubs helps to control plant competition.

These soils are generally unsuited to building site development and septic tank absorption fields. The slope is the main concern. Erosion on construction sites is a major problem. Excessive downslope seepage of septic tank effluent is likely.

The Rigley soil is unsuited to use as a site for ponds. Ponds can be developed in areas of the Coshocton soil, especially in areas where springs are available. Onsite investigation is needed to determine the thickness of the layers of clay shale.

The land capability classification is VIe. The pasture and hayland suitability group is A-3. The woodland ordination symbol is 4R on north aspects and 3R on south aspects.

RoF—Rodman gravelly sandy loam, 25 to 70 percent slopes. This deep, steep and very steep, excessively drained soil is on dissected hillsides and escarpments on glacial outwash terraces. Most areas are long, very narrow, and winding. They range from 2 to 10 acres in size.

Typically, the surface layer is black, very friable gravelly sandy loam about 9 inches thick. The subsurface layer is very dark grayish brown and dark yellowish brown, very friable gravelly sandy loam about 3 inches thick. The subsoil is dark brown, very friable gravelly sandy loam about 8 inches thick. The underlying material to a depth of 60 inches or more is dark brown and dark yellowish brown, loose very gravelly sand and very gravelly loamy sand. In some areas the surface layer is loam or loamy sand. In some places the surface layer and the upper part of the subsoil are very strongly acid. In a few cultivated areas, the soil is severely eroded.

Included with this soil in mapping are small areas of Lakin, Chili, and Watertown soils. Lakin soils have alternating layers of fine sandy loam and loamy fine sand in the subsoil. Chili and Watertown soils are in moderately steep areas. They have a thicker subsoil than the Rodman soil. Also included are areas in the flood pools of the Dillon Lake dam and the Wills Creek dam that are subject to controlled flooding. Included areas make up about 20 percent of most delineations.

Permeability is moderately rapid in the subsoil of the Rodman soil and very rapid in the underlying material. Runoff is rapid. Available water capacity is low. The content of organic matter is moderate. The rooting depth is limited by sand and gravel layers at a depth of 20 to 30 inches. The capacity to store and release plant nutrients is low.

Most areas are used as woodland or pasture.

This soil is generally unsuited to crops and pasture. The slope restricts the use of equipment, and the hazard of erosion is very severe. Also, productivity is limited because the soil is very droughty. Maintaining a permanent cover of plants that can tolerate drought is the best means of controlling erosion.

This soil is only moderately suited to timber production. The aspect of the slope affects the planting and growth of trees. Coves and north- and east-facing slopes are the best woodland sites. They have cooler temperatures and more available water than other sites because they are less exposed to the sun and prevailing winds. The soil has low strength when wet and cannot support heavy equipment. Spreading aggregate on haul roads or log landings helps to stabilize the surface. The slope limits the use of planting and logging equipment. Establishing roads and skid trails on the contour helps to control erosion. Establishing water bars and maintaining a vegetative cover also help to control erosion. Using seedlings that have been transplanted once or adding mulch can reduce the seedling mortality rate on south-facing slopes.

This soil is generally unsuited to building site development and septic tank absorption fields. The slope is a serious limitation on building sites. Caving and slippage occur in areas where streams undercut the hillside. Maintaining as much vegetative cover as possible during construction reduces the hazard of erosion. Excessive downslope seepage of septic tank effluent is likely. Ponds are very unlikely to hold water.

The land capability classification is VIIs. The pasture and hayland suitability group is H-1. The woodland ordination symbol is 4R.

Se—Sebring silt loam. This deep, nearly level, poorly drained soil is in low areas on terraces in the valleys of former glacial lakes. It receives runoff from adjacent soils and is subject to ponding, especially in areas on flats that do not have an outlet for surface water. Some areas are drained by ditches. Slopes range from 0 to 2 percent. Most areas range from 30 to 100 acres in size.

Typically, the surface layer is dark gray, firm silt loam about 10 inches thick. The subsoil is grayish brown, dark grayish brown, and yellowish brown, firm silty clay loam about 45 inches thick. It is mottled. The underlying material to a depth of 60 inches or more is grayish brown, mottled, firm silt loam. In some areas the surface layer is silty clay loam. In other areas the subsoil contains more sand and gravel.

Included with this soil in mapping are areas of Luray, Lorain, Fitchville, Melvin, and Newark soils. The very poorly drained Luray and Lorain soils are in depressions. They are generally in areas less than 2 acres in size. They have a darker surface layer that contains more organic matter than that of the Sebring soil. Lorain soils have more clay in the subsoil than the Sebring soil. The somewhat poorly drained Fitchville soils are on slight rises. Areas of Melvin and Newark soils are on flood plains and are less than 100 feet wide. Also included are areas in the flood pools of the Dillon Lake dam and the Wills Creek dam that are subject to controlled flooding. Included areas make up about 20 percent of most delineations.

Permeability is moderately slow in the Sebring soil. Runoff is very slow or ponded. Available water capacity is high. The content of organic matter is moderate in the surface layer. The seasonal high water table is at or above the surface during extended wet periods. It restricts the rooting depth well into the growing season. The root zone is deep in drained areas. The potential for frost action is high. The shrink-swell potential is moderate. The capacity to store and release plant nutrients also is moderate.

Most areas are unimproved pasture and support weeds, brush, and trees that are adapted to wetness. Areas that have not been drained have potential as wetland. Drained areas are used for crops, mainly corn and soybeans.

If drained, this soil is only moderately suited to row crops, small grain, and hay. Most areas require both surface and subsurface drainage. Surface drains help to remove excess water in ponded areas. Subsurface drains can lower the water table in areas where drainage outlets are available. Pumps are needed in areas where outlets are not available. Diversions and open ditches can remove runoff from adjacent slopes, but they are expensive to maintain. If the soil is cultivated, surface crusting after rains reduces the rate of water infiltration and retards the emergence of seedlings. Limiting fieldwork when the surface layer and subsoil are too wet helps to minimize compaction. Ridge tillage can improve yields.

If drained, this soil is only moderately suited to hay and pasture. Species that can tolerate wetness should be selected for seeding. Few areas are drained well enough for alfalfa. Areas that have not been drained are poorly suited to hay and pasture. Rushes and other swamp plants crowd out the seeded forage plants. Extended periods of ponding can destroy the vegetation. Deferred grazing during wet periods helps to prevent compaction of the surface layer and damage to plant roots. In areas that have not been drained, however, wet periods are common during much of the year.

This soil is only moderately suited to timber production. The ponding and the wetness affect the planting, growth, and harvesting of trees. Native bottomland hardwoods that can tolerate wetness grow well. Selecting water-tolerant species for planting reduces the seedling mortality rate. Planting and logging should take place during dry periods or when the soil is frozen. The hazard of windthrow can be reduced by using harvesting methods that do not leave the remaining trees isolated or widely spaced. Removing vines and the less desirable trees and shrubs helps to control plant competition. The soil is well suited to habitat for wetland wildlife.

This soil is generally unsuited to use as a site for buildings or for septic tank absorption fields. The seasonal high water table is the main concern. Commonly, corrective measures are not practical.

There are no natural pond sites. Excavated ponds are likely to hold water, but they may dry up during extended dry periods. Onsite investigation is needed to determine the nature of the underlying material. In some areas a low fill can be built to create a shallow wetland pond.

The land capability classification is IIIw. The pasture and hayland suitability group is C-2. The woodland ordination symbol is 5W.

St—Stonelick loam, occasionally flooded. This deep, nearly level, well drained soil is on flood plains. Areas of this soil are in the flood pool of the Dillon Lake dam, which is subject to controlled flooding. The flooding can last for several days. The rate of sedimentation is high along the river channel above the reservoir. Slopes range from 0 to 2 percent. Most areas of this soil are along and parallel to the meanders of the river. They are more than 100 acres in size.

Typically, the surface layer is dark grayish brown, friable loam about 6 inches thick. The underlying material, to a depth of about 60 inches, is brown and dark grayish brown, friable loam and silt loam and brown, very friable fine sandy loam. Below this to a depth of 75 inches or more is dark grayish brown loam and light yellowish brown loamy fine sand. In some areas the underlying material contains more silt and less sand. In other areas the underlying material is very gravelly sand or very gravelly loamy sand. In a few places the soil is not calcareous throughout.

Included with this soil in mapping are narrow areas of the somewhat poorly drained Newark soils. These soils are in slight depressions and channels. They make up about 20 percent of most delineations.

Permeability is moderately rapid in the Stonelick soil. Runoff is slow. Available water capacity, the content of organic matter, and the potential for frost action are moderate. The root zone is deep. The capacity to store and release nutrients is moderate, but nutrient deficiencies may occur because of the mild alkalinity of the soil.

Most areas are used as wildlife habitat or as cropland. Corn and soybeans are the main crops. Some of the crops are left as food for wildlife each year.

This soil is only moderately suited to corn and soybeans. It is generally unsuited to small grain because of the hazard of flooding. Controlled flooding occurs in most years during the early part of the growing season, and planting is delayed. Conserving soil moisture is a management concern. Using a system of conservation tillage, such as no-till farming, that leaves crop residue on the surface conserves moisture and increases the rate of water infiltration. Applications of lime should not be needed. Applications of an acid-forming fertilizer can lower the pH of the soil. Banded or split applications of fertilizer can minimize the loss of water. Limiting fieldwork when the surface layer and subsoil are too wet helps to minimize compaction. Streambank erosion is a major source of sediments that pollute the water. Streambanks can be stabilized by shaping, by planting shrubs, and by placing stone riprap in some places. Controlling weeds is a concern because weed seeds are carried in by floodwater. Winter cover crops protect the soil from scouring.

This soil is well suited to hay. Species that can tolerate droughtiness are the best suited. The prolonged controlled flooding can damage or kill hay plantings. Including legumes in the seeding mixture provides nitrogen for subsequent corn crops.

This soil is well suited to pasture. A wide variety of adapted forage plants can thrive on this soil. The early warming of the soil results in good spring pasture, but droughtiness limits production later in the growing season. The controlled flooding during the growing season reduces the quality of forage.

This soil is well suited to timber production. The flooding affects the planting, growth, and harvesting of trees. Native bottom-land hardwoods that can tolerate flooding grow well. Because the flooding is usually brief, most management activities can be performed during periods when the soil is not flooded.

This soil is generally unsuited to use as a site for buildings or for septic tank absorption fields because of the flooding.

The land capability classification is IIw. The pasture and hayland suitability group is A-5. The woodland ordination symbol is 4A.

Ta—Tioga fine sandy loam, rarely flooded. This deep, nearly level, well drained soil is on flood plains along the major streams. Most areas are on flood plains that are elevated only a few feet above the more frequently flooded bottom land. A few areas are natural levees along the river channel. Flooding is partially controlled by upstream dams of the Muskingum Conservancy District and by the Dillon Lake dam. The flooding is limited to rare periods of very high runoff. Slopes range from 0 to 3 percent. Most areas are crescent-shaped meander scars and range from 10 to 100 acres in size.

Typically, the surface layer is dark grayish brown, very friable fine sandy loam about 8 inches thick. The subsoil is dark yellowish brown and dark brown, friable fine sandy loam and dark brown, very friable sandy loam about 26 inches thick. The underlying material to a depth of 60 inches or more is brown, loose, stratified loamy fine sand. In some areas the soil has a dark surface layer that has a higher content of organic matter. In other areas the surface layer and the upper part of the subsoil are silt loam or loam.

Included with this soil in mapping are narrow strips of soils that have loamy sand below the surface layer. These soils are more droughty than the Tioga soil. Also included are a few areas of Watertown and Chavies soils and areas in the flood pools of the Dillon Lake dam and the Wills Creek dam that are subject to controlled flooding. Watertown and Chavies soils are on the highest swells and are not flooded. Included areas make up about 20 percent of most delineations.

Permeability is moderate or moderately rapid in the Tioga soil. Runoff is slow. Available water capacity is moderate. The content of organic matter is moderate in the surface layer. The root zone is deep, but few roots penetrate the sandier layers in the underlying material during dry periods. The capacity to store and release plant nutrients is low. The potential for frost action is moderate.

Most areas are used for crops. Some areas are irrigated. The irrigation improves yields during dry periods. Very few areas are wooded.

This soil is well suited to corn, soybeans, and wheat and to specialty crops, such as melons, tomatoes, cucumbers, and potatoes. The soil dries early in the spring and is well suited to irrigation. Conserving soil moisture is the main management concern. The soil is better suited to crops that mature early in the growing season than to late-season crops. Using a system of conservation tillage, such as no-till farming, that leaves crop residue on the surface conserves moisture and increases the rate of water infiltration. Banded or split applications of fertilizer minimize the loss of nutrients, especially nitrogen, and help to prevent the pollution of ground water Limiting fieldwork when the surface layer and subsoil are too wet helps to minimize compaction. Streambank erosion is a major source of sediments that pollute the water. Streambanks can be stabilized by shaping, by planting shrubs, and by placing stone riprap in some places. Controlling weeds is a concern because weed seeds are carried in by floodwater. Winter cover crops protect the soil from scouring. In some areas, grass-lined floodwater channels are needed to handle peak flow and minimize scouring. Diversions at the base of slope breaks to the uplands or terraces minimize the damage caused by flash flooding.

This soil is well suited to hay and pasture. Species that can tolerate droughtiness are the best suited. The flooding can damage plantings of hay. The moisture needed for good seed germination is most likely to be available in early spring. Seeding a companion crop of small grain reduces the hazard of flood damage, but the grain crop competes for the limited supply of moisture. Including legumes in the seeding mixture provides nitrogen for subsequent crops. The early warming of the soil produces good spring pasture, but droughtiness limits production during the summer.

This soil is well suited to timber production, but only a small acreage is used as woodland. No major limitations affect the planting, growth, or harvesting of trees. Native bottom-land hardwoods grow well.

This soil is poorly suited to use as a site for buildings because of the flooding. Elevating structures and roads above known flood levels can protect them from flood damage. The fill may restrict the natural floodway and result in more flooding upstream.

This soil is only moderately suited to septic tank absorption fields. The soil readily absorbs but does not adequately filter the effluent. The poor filtering capacity can result in the pollution of ground water. Elevating the absorption field with suitable fill material can improve the filtering capacity of the soil. Perimeter drains can reduce the wetness by lowering the water table.

Some areas are used as a source of sand and gravel. Excavated ponds are very unlikely to hold water.

The land capability classification is IIs. The pasture and hayland suitability group is A-5. The woodland ordination symbol is 4A.

Tf—Tioga fine sandy loam, occasionally flooded. This deep, nearly level, well drained soil is on flood plains along the major streams. It is flooded for brief periods in winter and spring. Flooding occurs more often along Wakatomika Creek than in other watersheds. In most areas the soil is adjacent to stream channels and forms a natural levee that is higher in elevation than other soils on the flood plain. Most areas are 5 to 80 acres in size. Slopes range from 0 to 2 percent.

Typically, the surface layer is brown, very friable fine sandy loam about 20 inches thick. The subsoil is about 18 inches thick. It is brown and dark yellowish brown, very friable sandy loam and yellowish brown loamy sand. The underlying material to a depth of 60 inches or more is yellowish brown and dark brown, stratified loam and fine sandy loam. In some areas the subsoil and the upper part of the underlying material contain more clay. In other areas the surface layer is loam. Areas along Wakatomika Creek are frequently flooded.

Included with this soil in mapping are areas of the moderately well drained Lindside soils. These soils are in slight depressions and are generally in areas less than 2 acres in size. Also included are a few areas of Watertown and Chavies soils on low terraces that are not subject to flooding and areas in the flood pools of the Dillon Lake dam and the Wills Creek dam that are subject to controlled flooding. Included areas make up about 15 percent of most delineations.

Permeability is moderate or moderately rapid in the Tioga soil. Runoff is slow. The content of organic matter is moderate in the surface layer. The root zone is deep. The capacity to store and release plant nutrients is low. The depth to a seasonal high water table is controlled by the level of stream flow, but it is usually more than 4 feet. The potential for frost action is moderate.

Most areas are used for cultivated crops or for hay and pasture.

This soil is well suited to crops, especially corn and soybeans. Winter grain crops may be damaged by flooding. Conserving soil moisture is a management concern. Using a system of conservation tillage, such as no-till farming, that leaves crop residue on the surface conserves moisture and increases the rate of water infiltration. Banded or split applications of fertilizer can minimize the loss of nutrients, especially nitrogen, and help to prevent the pollution of ground water. Limiting fieldwork when the surface layer and subsoil are too wet helps to minimize compaction. Land grading in a few areas allows surface water to drain faster. Keeping stream channels free of obstructions, such as logjams, helps to prevent flooding. Small levees have been constructed in some areas to minimize flooding. Streambank erosion is a major source of sediments that pollute the water. Streambanks can be stabilized by shaping, by planting shrubs, and by placing stone riprap in some places. Controlling weeds is a concern because weed seeds are carried in by floodwater. Winter cover crops protect the soil from scouring. In some areas, grass-lined floodwater channels are needed to handle peak flow and minimize scouring. Diversions at the base of slope breaks to the uplands or terraces minimize the damage caused by flash flooding.

This soil is well suited to hay and pasture. In areas used for hay, species that can tolerate droughtiness are the best suited. In newly seeded areas the damage caused by flooding can be minimized by seeding a companion crop, such as small grain, or by delaying seeding until after the flooding season. Finely tilled seedbeds are the most likely to be damaged by floodwater. Including legumes in the seeding mixture provides nitrogen for subsequent row crops. A wide variety of adapted forage plants can thrive on this soil. The early warming of the soil results in good spring pasture, but droughtiness limits production during the summer. Brief periods of flooding during the growing season reduce the quality of forage.

This soil is well suited to timber production. The flooding affects the planting, growth, and harvesting of trees. Native bottom-land hardwoods that can tolerate flooding grow well. Because the flooding is usually brief, most management activities can be performed during periods when the soil is not flooded.

This soil is unsuited to use as a site for buildings because of the flooding. Local roads and streets can be constructed on fill material above the expected level of flooding, but extensive filling results in increased flooding upstream.

This soil is generally unsuited to use as a site for septic tank absorption fields because of the flooding. The surfacing of effluent during periods of flooding is likely to pollute streams.

Excavated ponds are very unlikely to hold water and are subject to flood damage.

The land capability classification is IIw. The pasture and hayland suitability group is A-5. The woodland ordination symbol is 4A.

Ud—Udorthents, loamy, hilly. These soils are in areas where the landscape has been altered by cutting, filling, or leveling. They are mainly along highways and airport runways, in urban areas, and near dams. In areas that have been cut, the exposed surface is similar to the subsoil and underlying material of adjacent soils. In fill areas, the soil material is more varied and the fill material is a mixture of the subsoil and underlying material of nearby soils. The degree of compaction of the fill is highly variable. Slopes range from 1 to 40 percent but are dominantly 10 to 30 percent. Most areas are roughly rectangular and range from 5 to 40 acres in size.

Typically, the surface layer is brown silt loam about 2 inches thick. The underlying material to a depth of 60 inches or more is brown or yellowish brown clay loam or channery clay loam. The content of coarse fragments ranges from 5 to 35 percent. In areas around the Zanesville airport, the soils contain very few coarse fragments. Some areas of these soils are adjacent to Fairpoint soils and are reclaimed mine land. A few cuts are dominantly clay shale bedrock.

Included with these soils in mapping are long, narrow bedrock escarpments. Urban land covers much of the surface in some areas. Some areas, such as sanitary landfills, have a high proportion of unstable organic material, which will gradually decompose and settle. Also included are areas in the flood pools of the Dillon Lake dam and the Wills Creek dam that are subject to controlled flooding. Included areas make up about 30 percent of most delineations.

Permeability and runoff are variable in the Udorthents. Available water capacity is low or very low because of the content of rock fragments and compaction. Hard rains tend to seal the surface in poorly vegetated areas. The root zone generally is moderately deep, but it is variable in some areas, depending on the degree of compaction.

Most areas are used for urban development. In some areas, trees or grasses, such as fescue, have been established after grading. The soils are generally unsuited to cultivated crops but are moderately suited to pasture and woodland.

Erosion is a major management concern in cut areas and on filled banks. Crusting reduces the rate of water infiltration and restricts the emergence and growth of plants. As the rate of water infiltration decreases, runoff and erosion increase. Planting grasses is the most common method of controlling erosion. Resurfacing with topsoil can increase the depth of the root zone and improve the moisture-holding capacity of the soils. Surface and subsurface drainage is needed in some areas.

The suitability of these soils as sites for buildings, roads, and septic tank absorption fields varies widely. Onsite evaluation is needed.

No land capability classification, pasture and hayland suitability group, or woodland ordination symbol is assigned.

Ug—Udorthents, sandy, rolling. These soils are on glacial outwash terraces in areas of sand and gravel mining. Mining has removed or mixed the original soil material. Grading has removed steep banks and buried large stones. The surface has been blanketed with soil material after mining. Ponds are in former pits in some areas. Slopes range from 4 to 15 percent. Most areas are rectangular and range from 10 to 40 acres in size.

Typically, the surface layer is brown gravelly loam about 10 inches thick. The underlying material to a depth of 60 inches or more is very pale brown very gravelly sand and sand.

Included with these soils in mapping are areas of soils that do not have gravel in the surface layer and underlying material and areas of soils that have 35 to 60 percent gravel. Included areas make up about 25 percent of most delineations.

Permeability is very rapid in the Udorthents. Runoff is slow or medium. Available water capacity is very low. The content of organic matter also is very low.

Grasses and legumes have been planted in most areas, but a few areas are cultivated.

These soils are only moderately suited to cultivated crops and hay. Droughtiness and erosion are the major management concerns. The soils warm up and dry early in the spring, but they are droughty in summer. They are better suited to crops that mature early in the growing season than to full-season crops. Deep-rooted forage crops, such as alfalfa, are less affected by droughtiness. If the soils are cultivated, the hazard of erosion is moderate. Using a system of conservation tillage, such as no-till farming, that leaves crop residue on the surface conserves moisture and helps to control erosion. Including grasses and legumes in the cropping system, planting cover crops, tilling on the contour, stripcropping, and establishing grassed waterways also reduce the hazard of erosion. Banded or split applications of fertilizer minimize the loss of nutrients, especially nitrogen, and help to prevent the pollution of ground water.

These soils are moderately suited to pasture or trees. Improving fertility and selecting adapted plant species are management concerns. Native or adapted species that can tolerate droughtiness and low fertility should be selected. Mulching around tree seedlings helps to retain moisture and increases growth.

The suitability of these soils as sites for buildings, roads, or sanitary facilities varies. Onsite investigation is needed. Excavated ponds are very unlikely to hold water unless the excavation extends below the water table.

No land capability classification, pasture and hayland suitability group, or woodland ordination symbol is assigned.

Uh—Udorthents, sandy-skeletal, steep. These soils are in areas of sand and gravel mining on glacial outwash terraces. Mining has obliterated or mixed the natural soil layers. Slopes range from 20 to 60 percent. Small ponds are in the deeper excavations. Most areas are rectangular and range from 10 to 200 acres in size.

Typically, these soils are very pale brown very gravelly sand to a depth of 60 inches or more.

Included with these soils in mapping are areas of Rodman soils. Rodman soils have a surface layer that is darker than that of the Udorthents. Also included are bedrock outcrops and spoil piles of rock and loamy material. Included areas make up about 20 percent of most delineations.

Permeability is rapid in the Udorthents. Runoff also is rapid. Available water capacity is dominantly very low. The content of organic matter is very low. The content of rock fragments ranges from 30 to 80 percent. The capacity to store and release plant nutrients is very low.

Most areas support shrubs and trees that have reseeded naturally. Some areas are used as dumps.

These soils are unsuited to crops and pasture because of droughtiness, low fertility, and the slope. A permanent plant cover should be established. Native or adapted species that can tolerate low fertility and droughtiness should be selected. Blanketing the surface with topsoil helps to establish a plant cover.

The suitability of these soils as sites for buildings, roads, or septic tank absorption fields varies. Onsite investigation is needed to determine the suitability and limitations of a specific site. Excavated ponds are very unlikely to hold water unless the excavation extends below the water table.

No land capability classification, pasture and hayland suitability group, or woodland ordination symbol is assigned.

Uk—Udorthents-Pits complex. This map unit is in areas that are being actively surface-mined for coal or limestone. Many of these areas will be reclaimed after the mining is completed. The Udorthents are gently sloping to very steep and are very channery or extremely channery. They are near pits. Pits are deep excavations made into bedrock to uncover the coal seam. Individual areas of this unit are about 60 percent Udorthents and 20 percent pits.

Typically, Udorthents are ridges and cone-shaped piles 10 to 70 feet high that consist of a mixture of rock fragments and partially weathered fine earth material. The rock fragments are mainly sandstone, siltstone, and shale in surface-mined areas and are limestone in limestone quarries. The content of rock fragments, including large stones and boulders, ranges from about 20 to 80 percent.

Pits have a nearly level floor between the piles of Udorthents and the vertical highwalls of bedrock.

Included in mapping are moderately deep and deep natural soils in small scattered areas in pits or around the edges of pits. Some spoil piles are mostly black, carbonaceous shale. Also included are areas of loamy Udorthents, which are stockpiles of surface and subsoil material. These areas are in landscape positions above or below the mining activities. Included areas make up about 20 percent of most delineations.

Permeability is variable in the Udorthents but is generally moderate or moderately slow. Runoff is very rapid. Available water capacity is very low.

The hazard of erosion is very severe in areas of Udorthents where the surface is bare. Suitable plant cover is needed to control erosion. A number of abandoned limestone and sandstone quarries, which are adjacent to active quarries, support brush and trees and provide habitat for wildlife. In reclaimed areas where sandstone was quarried, grasses and trees that can tolerate the very low available water capacity and extremely acid reaction should be selected for planting. Species that can tolerate a high content of lime should be selected for planting in areas where limestone was quarried. Some areas are suited to crops and pasture if reclaimed. The degree of suitability depends on the quality of the reclamation and the final slope of the land.

The suitability of areas of this unit as sites for buildings or septic tank absorption fields is highly variable. Onsite investigation is needed to determine the potential and limitations for a proposed use. If reclamation is properly planned and implemented, many areas could be used as building sites after the soils have settled.

No land capability classification, pasture and hayland suitability group, or woodland ordination symbol is assigned.

UsB—Urban land-Glenford complex, 2 to 8 percent slopes. This map unit consists of gently sloping areas of Urban land and Glenford soil. The areas of Urban land are covered by buildings and pavement. The deep, nearly level to strongly sloping, moderately well drained Glenford soil is in undisturbed areas on the terraces of former glacial lakes. Because of the patterns of urban development, most areas of this map unit are rectangular and range from 10 to 500 acres in size. They are about 50 percent Urban land and 25 percent Glenford soil.

In the areas of Urban land, the surface layer is impermeable because of concrete or bituminous pavement and building rooftops. A layer of coarse aggregate, crushed limestone, gravel, or sand about 6 to 12 inches thick is commonly beneath the surface. The underlying material is generally highly compacted earthfill or layers of stratified silt, clay, and fine sand.

Typically, the surface layer of the Glenford soil is brown silt loam about 9 inches thick. The subsoil is about 31 inches thick. The upper part is brown, friable silt loam; the next part is yellowish brown, mottled, friable silt loam; and the lower part is brown, mottled, firm silty clay loam. The underlying material to a depth of about 60 inches is brown, mottled, firm silt loam. In some places the subsoil contains more clay. In a few areas the subsoil has layers of loam and sandy loam or has a fragipan.

Included in mapping are areas of the poorly drained Sebring soils, areas of the somewhat poorly drained Fitchville soils, and areas of the well drained Alford soils. Sebring soils are in depressions. Fitchville soils are on flats. Alford soils are on elevated knolls. Also included are strongly sloping, dissected areas of Glenford or Markland soils and many areas of loamy Udorthents. Udorthents are near excavations for buildings. The excavated material is mixed or filled to such an extent that soil layers are not distinguishable. This material is commonly compacted, very firm silty clay loam or silt loam. Included soils make up about 25 percent of most delineations.

Plant growth and water infiltration are restricted by the impermeable surface in areas of Urban land.

Permeability is moderately slow in undisturbed areas of the Glenford soil. Runoff is medium. Available water capacity is high. Tilth is good, and the root zone is deep. Most areas have been drained by storm sewer systems, gutters, and drainage ditches. Undrained areas have a seasonal high water table at a depth of about 24 to 36 inches during extended wet periods. The Glenford soil is in open areas that are used for lawns, gardens, or parks. It is well suited to gardens, lawns, shrubs, and trees. The included areas of Udorthents are not well suited to lawns and gardens. Artificial drainage is beneficial in areas of the included Fitchville and Sebring soils.

The Glenford soil is only moderately suited to use as a site for buildings. The seasonal wetness and a moderate shrink-swell potential are the main limitations. Installing drains at the base of footings and coating exterior basement walls help to prevent wet basements. Backfilling along foundation walls with material that has a low shrink-swell potential can minimize the damage caused by shrinking and swelling. Runoff and erosion on construction sites can be controlled by maintaining a vegetative cover on the surface and reseeding exposed areas as soon as possible. Surface water from adjacent slopes should be diverted away from the building site.

The Glenford soil is only moderately suited to use as a site for septic tank absorption fields. The seasonal wetness and the restricted permeability are limitations. Using perimeter drains around septic tank absorption fields helps to lower the seasonal high water table. Enlarging the absorption field improves the absorption of effluent. Landscaping the areas used as septic tank absorption fields can provide good surface drainage away from the absorption field. In the steeper areas, distribution lines should be laid across the slope.

No land capability classification, pasture and hayland suitability group, or woodland ordination symbol is assigned.

UtA—Urban land-Nolin complex, rarely flooded. This map unit consists of areas of Urban land and areas of Nolin soil that are intermingled in a pattern so intricate that they cannot be mapped separately. The areas of Urban land are covered by buildings and pavement. The deep, nearly level, well drained Nolin soil is on flood plains that receive sediments from overflowing streams. It is subject to rare flooding. Slopes range from 0 to 3 percent. Because of the pattern of urban development, most areas of this map unit are rectangular and range from 10 to 500 acres in size. They are about 50 percent Urban land and 30 percent Nolin soil.

In the areas of Urban land, the surface layer is impermeable because of concrete or bituminous pavement and building rooftops. A layer of coarse aggregate, crushed limestone, gravel, or sand about 6 to 12 inches thick is commonly beneath the surface. The underlying material is generally highly compacted earthfill or weathered siltstone or shale bedrock.

Typically, the surface layer of the Nolin soil is dark brown, friable silt loam about 7 inches thick. The underlying material to a depth of 60 inches or more is dark brown and yellowish brown, friable silt loam. In some areas the soil is moderately well drained. In other areas the soil has a higher content of sand. Some places have been excavated and filled to such an extent that soil layers are not distinguishable. In some areas the surface layer and subsoil are loam and sandy loam.

Included in mapping are small areas of the poorly drained Melvin and somewhat poorly drained Newark soils. These soils are in low areas. Many areas of Urban land have been filled to raise the surface above normal flood levels. Many areas along the Muskingum and Licking Rivers are protected by upstream flood-control dams and local levees. Included areas make up about 20 percent of most delineations.

Plant growth and water infiltration are restricted by the impermeable surface in areas of Urban land.

Permeability is moderate in the Nolin soil. Runoff is slow. Available water capacity is very high. The content of organic matter is moderate. The surface layer is friable. The infiltration rate is good, even when the surface is crusted. The root zone is deep. A seasonal high water table is at a depth of 3 to 6 feet during extended wet periods.

Small levees have been constructed in some areas to minimize flooding. Surface drains help to remove floodwater in a few low areas. Streambank erosion is a major source of sediments that cause water pollution. Stabilizing eroding streambanks is difficult in most areas, but clearing the channel of debris and planting willows on the streambanks are effective measures in some areas.

Open areas of this map unit are generally too small to be used as cropland, but they are well suited to lawns and gardens.

The Nolin soil is well suited to timber production, but only a small acreage is used as woodland. Most open areas are too small to be used as commercial woodlots. Flooding affects the planting, growth, and harvesting of trees. Native bottom-land hardwoods grow well. Because the flooding is usually brief, most management activities can be performed during periods when the soil is not flooded.

The Nolin soil is poorly suited to use as a site for buildings because of the flooding. Buildings and roads can be elevated on fill material above the level of flooding, but the fill partially blocks the natural floodway and increases the level and duration of flooding upstream.

The Nolin soil is only moderately suited to use as a site for septic tank absorption fields. Elevating the field can reduce the hazard of flood damage and increases the depth to the water table. Perimeter drains can be used to lower the water table. Excavated ponds are unlikely to hold water and are subject to flood damage.

No land capability classification, pasture and hayland suitability group, or woodland ordination symbol is assigned.

UvB—Urban land-Watertown complex, 1 to 15 percent slopes. This map unit consists of areas of Urban land and areas of Watertown soil that are intermingled in such an intricate pattern that they cannot be mapped separately. The Urban land is covered by buildings or pavement. The deep, nearly level to strongly sloping, well drained Watertown soil is on terraces of glacial outwash. Because of the pattern of urban development, most areas of this map unit are rectangular and range from 10 to 500 acres in size. They are about 50 percent Urban land and 25 percent Watertown soil.

In areas of the Urban land, the surface layer is impermeable because of concrete or bituminous pavement and building rooftops. A layer of coarse aggregate, crushed limestone, gravel, or sand about 6 to 12 inches thick is commonly beneath the surface. The underlying material is generally highly compacted earthfill or stratified layers of sand and gravel.

Typically, the surface layer of the Watertown soil is dark brown, very friable sandy loam about 10 inches thick. The subsoil is about 43 inches thick. The upper part is brown sandy loam, and the lower part is brown sandy loam, loamy sand, and gravelly loamy sand. The underlying material to a depth of 60 inches or more is brown loamy sand and gravelly loamy sand. Many areas around buildings have been excavated and filled to such an extent that the soil layers cannot be distinguished. Some areas have a surface layer of loam or silt loam.

Included in mapping are a few areas of Rodman and Chili soils. Rodman soils are on steep or very steep slopes between terraces and flood plains. Chili soils are more gravelly in the surface layer and subsoil than the Watertown soil. Included soils make up about 25 percent of most delineations.

Plant growth and water infiltration are restricted by the paved surfaces in areas of Urban land.

Permeability is moderately rapid in the subsoil of the Watertown soil and is very rapid in the underlying material. Runoff is medium. Available water capacity is low. The root zone is deep.

The Watertown soil is used for lawns and gardens. It is only moderately suited to lawns, trees, shrubs, and vegetable and flower gardens because of droughtiness. It is poorly suited to use as a site for water impoundments because of the very rapidly permeable underlying material and the hazard of seepage.

Included areas of cut and fill land are not well suited to lawns and gardens. Exposed subsoil material has fair or poor tilth. Adding organic material to the soil improves tilth.

The Watertown soil is well suited to use as a site for buildings. Maintaining a vegetative cover on the surface helps to minimize runoff and reduces the hazard of erosion on construction sites. Stockpiling surface soil and using it to blanket the surface during final grading help to reestablish the plant cover. Caving is a hazard in excavations.

The Watertown soil is only moderately suited to use as a site for septic tank absorption fields. The limited thickness of soil material that can provide an adequate filter is a management concern. The underlying material is a poor filter, and untreated effluent that reaches this material can pollute ground water. Where possible, sanitary facilities should be connected to central sewers. Leach lines in septic tank absorption fields should be installed across the slope and as close to the surface as possible.

No land capability classification, pasture and hayland suitability group, or woodland ordination symbol is assigned.

UwC—Urban land-Wellston complex, 5 to 15 percent slopes. This map unit is on upland ridgetops in areas where considerable urban development has occurred. The Urban land consists of areas covered by buildings or pavement. The deep, well drained Wellston soil is in undisturbed areas. Areas of the Urban land and the Wellston soil are intermingled in such a complex pattern that it was not possible to separate them in mapping. Because of the pattern of urban development, most areas of this map unit are rectangular and range from 10 to 300 acres in size. They are about 50 percent Urban land and 25 percent Wellston soil.

In areas of the Urban land, the surface is impermeable because of concrete or bituminous pavement and building rooftops. Commonly, a layer of coarse aggregate, crushed limestone, gravel, or sand about 6 to 12 inches thick is beneath the surface. The underlying material is generally highly compacted earthfill or weathered siltstone or shale bedrock.

Typically, the surface layer of the Wellston soil is brown, friable silt loam about 7 inches thick. The subsoil is about 47 inches thick. The upper part is brown, firm silty clay loam and friable or firm silt loam. The lower part is yellowish brown, firm silty clay loam and clay loam. The underlying material to a depth of 60 inches or more is channery clay loam and channery sandy loam. In some areas the subsoil is deeper and consists of silt loam that does not contain rock fragments.

Included in mapping are areas of Keene, Zanesville, Gilpin, and Rigley soils. The moderately well drained Keene and Zanesville soils are in low or seepy areas. The moderately deep Gilpin and Rigley soils are on shoulder slopes. They are sandier than the Wellston soil. Also included are the loamy Udorthents, which have been excavated and filled to such an extent that the original soil layers are not distinguishable. Udorthents are commonly compacted, very firm silty clay loam or clay loam. Included soils make up about 25 percent of most delineations.

Plant growth and water infiltration are restricted by pavement in areas of Urban land.

Permeability is moderate in the Wellston soil. Available water capacity is high. Runoff is medium or rapid. The potential for frost action is high.

Most areas are used for residential or commercial development. Undeveloped areas are vacant lots, parks, or lawns. The Wellston soil is well suited to lawns and trees. Mulching helps to control erosion.

The Wellston soil is well suited to use as a site for buildings. The slope and the depth to bedrock are limitations. Maintaining as much cover as possible on construction sites helps to control erosion, especially in strongly sloping areas. Constructing driveways across the slope also helps to control erosion.

The Wellston soil is moderately suited to use as a site for septic tank absorption fields. The slope and the depth to bedrock are limitations. Unfiltered effluent that seeps into the fractured bedrock can pollute ground water. Leach lines should be as close to the surface as possible. Providing suitable cover material helps to overcome the limited depth to bedrock. Laying the lines on the contour helps to prevent the surfacing of effluent.

No land capability classification, pasture and hayland suitability group, or woodland ordination symbol is assigned.

WaB—Watertown sandy loam, 1 to 8 percent slopes. This deep, nearly level and gently sloping, well drained soil is on glacial outwash terraces. Slopes are long and smooth. Individual areas are irregular in shape and range from 6 to 160 acres in size.

Typically, the surface layer is dark yellowish brown, very friable sandy loam about 12 inches thick. The subsoil is about 30 inches thick. The upper part is yellowish brown, friable sandy loam, and the lower part is brown, very friable loamy sand. The underlying material to a depth of 80 inches or more is yellowish brown, loose gravelly coarse sand and brown, loose very gravelly coarse sand. In some areas the surface layer is loam or loamy sand. In places the subsoil is fine sandy loam and loamy fine sand. In some nearly level areas, the surface layer is darker. In many areas the subsoil is less acid.

Included with this soil in mapping are areas of the well drained Chili soils. These soils have more gravel and slightly more clay in the subsoil than the Watertown soil. Also included are small areas of moderately well drained soils and areas in the flood pools of the Dillon Lake dam and the Wills Creek dam that are subject to controlled flooding. Included areas make up about 20 percent of most delineations.

Permeability is moderately rapid in the upper part of the subsoil of the Watertown soil. It is rapid in the lower part of the subsoil and in the underlying material. Runoff is slow or medium. Available water capacity is low. The content of organic matter is moderately low in the surface layer. The root zone is deep. The capacity to store and release plant nutrients is low.

Most areas are used for crops. Some areas are used for residential or commercial development. A few areas are used as woodland.

This soil is well suited to crops. Wheat, corn, and forage plants are the main crops. Conserving moisture is the main management concern. The hazard of erosion is moderate in cultivated areas. The soil dries early in the spring and is well suited to irrigation. Plants commonly show evidence of moisture stress in summer. The soil is better suited to crops that mature early in the growing season than to crops that mature late in summer. Using a system of conservation tillage, such as no-till farming, that leaves crop residue on the surface conserves moisture and increases the rate of water infiltration. Returning crop residue to the surface and applying barnyard manure increase the content of organic matter. Banded or split applications of fertilizer minimize the loss of nutrients, especially nitrogen, and help to prevent the pollution of ground water.

This soil is only moderately suited to hay and pasture. Deep-rooted forage plants that can tolerate droughtiness are the best suited. The early warming of the soil results in good spring pasture, but droughtiness limits production later in the growing season.

This soil is well suited to timber production, but only a small acreage is used as woodland. No major limitations affect the planting, growth, or harvesting of trees. Species that can tolerate droughtiness should be selected for planting.

This soil is well suited to use as a site for buildings. Maintaining as much vegetative cover as possible on construction sites reduces the hazard of erosion. Stockpiling the surface soil and using it to blanket the surface during final grading help to reestablish the plant cover. Caving is a hazard in excavations.

This soil is well suited to use as a site for septic tank absorption fields. The limited thickness of soil material that can provide an adequate filter is a management concern. The soil material in the lower part of the subsoil and the underlying material is a poor filter, and untreated effluent that reaches this material can pollute ground water. Leach lines in septic tank absorption fields should be as close to the surface as possible and should be backfilled with more absorbent soil material.

There are few natural pond sites, and excavated ponds are very unlikely to hold water.

This soil is recognized as farmland of local importance. The land capability classification is IIIs. The pasture and hayland suitability group is B-1. The woodland ordination symbol is 4A.

WaC—Watertown sandy loam, 8 to 15 percent slopes. This deep, strongly sloping, well drained soil is on glacial outwash terraces. It is on short slopes between benches. Slopes are short, but sheet and rill erosion is common. Most areas are long and narrow and range from 6 to 20 acres in size.

Typically, the surface layer is brown, friable sandy loam about 8 inches thick. The subsoil is about 30 inches thick. The upper part is dark brown, friable sandy loam. The lower part is dark yellowish brown, very friable loamy sand. The underlying material to a depth of 60 inches or more is yellowish brown, loose gravelly loamy coarse sand. In some areas the surface layer is loamy sand or loam. In places the subsoil is fine sandy loam and loamy fine sand. In many areas the soil is less acid.

Included with this soil in mapping are small areas of Chili and Chavies soils. These soils contain more gravel and slightly more clay in the subsoil than the Watertown soil. Also included are small areas of moderately well drained soils and small areas in the flood pools of the Dillon Lake dam and the Wills Creek dam that are subject to controlled flooding. Included areas make up about 20 percent of most delineations.

Permeability is moderately rapid in the subsoil of the Watertown soil. Runoff is medium or rapid. The content of organic matter is low. The root zone is moderately deep. Available water capacity is low. The capacity to store and release plant nutrients also is low.

Most areas are used for crops. A few areas are used as pasture.

This soil is only moderately suited to crops. Wheat, corn, and forage plants are the main crops. The hazard of erosion is moderate. The soil responds well to management practices that reduce surface runoff, increase the rate of water infiltration, and retain plant nutrients. The soil dries early in the spring and is well suited to irrigation. Plants commonly show evidence of moisture stress in summer. The soil is better suited to crops that mature early in the growing season than to full-season crops. Using a system of conservation tillage, such as no-till farming, that leaves crop residue on the surface conserves moisture and increases the rate of water infiltration. Deep-rooted forage crops, such as alfalfa, are less affected by droughtiness than other crops. Tilling on the contour and including small grain and forage plants in the cropping system help to control erosion and runoff. Returning crop residue to the surface and applying barnyard manure increase the content of organic matter. Banded or split applications of fertilizer minimize the loss of nutrients, especially nitrogen, and help to prevent the pollution of ground water. Grassed waterways help to control erosion in areas where runoff water is concentrated.

This soil is only moderately suited to pasture. The early warming of the soil results in good pasture, but droughtiness limits production during the summer. Plants seeded in early spring become better established than those seeded later in the growing season because of the droughtiness. Seeding cover crops, adding mulch, or using no-till seeding methods can reduce the hazard of erosion.

This soil is well suited to timber production, but only a small acreage is used as woodland. No major limitations affect the planting, growth, or harvesting of trees. Species that can tolerate drought should be selected for planting.

This soil is well suited to use as a site for buildings. The slope is a moderate limitation. Designing buildings so that they conform to the natural slope of the land reduces the need for land shaping. Caving is a hazard in excavations.

This soil is only moderately suited to use as a site for septic tank absorption fields. The thickness of subsoil material that can adequately filter the effluent is a concern. The underlying material is a poor filter, and untreated effluent that reaches this sandy material could pollute ground water. Leach lines in septic tank absorption fields should be installed across the slope and as close to the surface as possible. Maintaining as much vegetative cover as possible on construction sites helps to prevent erosion. Stockpiling the surface soil and using it to blanket the surface during final grading help to reestablish plant cover.

This soil is recognized as farmland of local importance. The land capability classification is IIIe. The pasture and hayland suitability group is B-1. The woodland ordination symbol is 4A.

WhB—Wellston silt loam, 2 to 8 percent slopes. This deep, gently sloping, well drained soil is on knolls and in saddles on ridgetops. Slopes are smooth and convex. Individual areas are 3 to 50 acres in size.

Typically, the surface layer is brown, friable silt loam about 7 inches thick. The subsoil is about 41 inches thick. The upper part is brown, friable silt loam and firm silty clay loam, and the lower part is yellowish brown, firm silty clay loam. Soft, weathered sandstone is at a depth of about 48 inches. In many places the silty material is more than 60 inches thick.

Included with this soil in mapping are small areas of

Rigley, Gilpin, Keene, and Zanesville soils. Rigley soils are more sandy than the Wellston soil. The moderately deep Gilpin soils are on shoulder slopes. The moderately well drained Keene and Zanesville soils are at the center of the broader ridgetops. Included soils make up about 20 percent of most delineations.

Permeability is moderate in the Wellston soil. Surface runoff is medium. Available water capacity is high. The content of organic matter is moderate in the surface layer. The root zone is deep. The capacity to store and release plant nutrients is moderate. The potential for frost action is high.

Most areas are used for crops or pasture. A small acreage is wooded.

This soil is well suited to cultivated crops, including specialty crops. The hazard of erosion is moderate in cultivated areas. The soil dries rapidly and warms up early in the spring. If the soil is cultivated, surface crusting after rains reduces the rate of water infiltration and retards the emergence of seedlings. Using a system of conservation tillage, such as no-till farming, that leaves crop residue on the surface, including grasses and legumes in the cropping system, planting cover crops, and tilling on the contour reduce the hazard of erosion. Limiting fieldwork when the surface layer and subsoil are too wet helps to minimize compaction.

This soil is well suited to hay and pasture. It is suited to a wide variety of forage plants. Acidity in the root zone is a limitation that affects some legumes. Frost heave can damage deep-rooted legumes, especially in pure stands. Leaving a protective cover of vegetation on the surface in the fall and including grasses in the seeding mixture can minimize the damage caused by frost heave. If the soil is plowed, the hazard of erosion is moderate. Seeding companion crops, adding mulch, or using no-till seeding methods reduces the hazard of erosion.

This soil is well suited to timber production. No major limitations affect the planting or growth of trees. The soil has low strength when wet and cannot support heavy equipment. Spreading aggregate on haul roads or log landings helps to stabilize the surface. Removing vines and the less desirable trees and shrubs helps to control plant competition.

This soil is well suited to use as a site for buildings. Areas of this soil are some of the best building sites in the uplands.

This soil is well suited to use as a site for septic tank absorption fields. The depth to bedrock limits the thickness of soil material that can adequately filter the effluent. Unfiltered effluent that seeps into the fractured bedrock can pollute ground water. Shallow leach lines that are covered by suitable material help to overcome the limited depth to bedrock. Laying the leach lines on the contour helps to prevent the surfacing of effluent.

There are few natural pond sites. Excavations for ponds are likely to extend into shattered rock, which cannot hold water unless it is blanketed with clay.

The land capability classification is IIe. The pasture and hayland suitability group is A-6. The woodland ordination symbol is 4A.

WhC2—Wellston silt loam, 8 to 15 percent slopes, eroded. This deep, strongly sloping, well drained soil is on shoulder slopes and broad ridgetops. A few areas are on benches. Slopes are generally smooth but are mildly dissected by a few shallow drainageways. Erosion has removed part of the original surface layer. Most areas are 4 to 20 acres in size.

Typically, the surface layer is yellowish brown, friable silt loam about 5 inches thick. The subsoil is about 39 inches thick. The upper part is brown, friable silt loam, and the lower part is yellowish brown, firm channery silty clay loam. The underlying material is light olive brown, firm channery clay loam and sandy loam about 4 inches thick. Soft, weathered sandstone is at a depth of about 48 inches. In many places the silty material is more than 60 inches thick. A few areas are severely eroded.

Included with this soil in mapping are small areas of Rigley and Gilpin soils. Rigley soils are more sandy than the Wellston soil. Gilpin soils are moderately deep. Also included are Keene soils in small areas where clay shale is beneath the subsoil. Included soils make up about 20 percent of most delineations.

Permeability is moderate in the Wellston soil. Runoff is medium. Available water capacity is moderate or high. The content of organic matter is moderately low in the surface layer. The root zone is deep. The capacity to store and release plant nutrients is moderate. The potential for frost heave is high.

Most areas are used for cultivated crops. Some areas are used as pasture or are wooded.

This soil is only moderately suited to cultivated crops. Many areas are eroded, and controlling further erosion is the main management concern. The hazard of erosion is severe in cultivated areas. The soil dries rapidly and warms up early in spring. If the soil is cultivated, surface crusting after rains reduces the rate of water infiltration and retards the emergence of seedlings. Using a system of conservation tillage, such as no-till farming, that leaves crop residue on the surface, including grasses and legumes in the cropping system, planting cover crops, tilling on the contour, stripcropping, and establishing grassed waterways reduce the hazard of erosion. Limiting fieldwork when the surface layer and subsoil are too wet helps to minimize compaction.

This soil is well suited to hay and pasture. It is suited to a wide variety of forage plants. Acidity in the root zone is a limitation that affects some legumes. Frost heave can damage deep-rooted legumes, especially in pure stands. Leaving a protective cover of vegetation on the surface in the fall and including grasses in the seeding mixture can minimize the damage caused by frost heave. If the soil is plowed, the hazard of erosion is moderate. Seeding companion crops, adding mulch, or using no-till seeding methods reduces the hazard of erosion.

This soil is well suited to timber production. No major limitations affect the planting or growth of trees. The soil has low strength when wet and cannot support heavy equipment. Spreading aggregate on haul roads or log landings helps to stabilize the surface. Removing vines and the less desirable trees and shrubs helps to control plant competition.

This soil is well suited to use as a site for buildings. The slope is the major management concern. Maintaining as much cover as possible on the surface helps to control erosion on construction sites. Constructing driveways across the slope also helps to control erosion.

This soil is only moderately suited to use as a site for septic tank absorption fields. The slope and the depth to bedrock are management concerns. Unfiltered effluent that seeps into the fractured bedrock can pollute ground water. Leach lines should be as close to the surface as possible. Providing suitable cover material helps to overcome the limited depth to bedrock. Laying out the leach lines on the contour helps to prevent the surfacing of effluent.

Excavations for ponds in the included draws are likely to expose shattered rock, which cannot hold water unless it is blanketed with clay.

This soil is recognized as farmland of local importance. The land capability classification is IIIe. The pasture and hayland suitability group is A-6. The woodland ordination symbol is 4A.

WmB—Westgate silt loam, 2 to 6 percent slopes. This deep, gently sloping, moderately well drained soil is on broad ridgetops and wide benches. Slopes are smooth and convex. Most areas are 5 to 20 acres in size.

Typically, the surface layer is brown, very friable silt loam about 7 inches thick. The subsoil is about 59 inches thick. The upper part is strong brown, friable silt loam and silty clay loam. It is mottled at a depth of more than 28 inches. The lower part of the subsoil is yellowish red, firm silty clay, clay, and silty clay loam. It is mottled. The underlying material is yellowish red, olive yellow, and dusky red, firm silty clay loam about 9 inches thick. Soft, weathered clay shale bedrock is at a depth of about 75 inches. In some areas, weathered siltstone is at a depth of more than 40 inches. In other areas the underlying material is gray or brown clay shale. Areas where the mantle of silt is thicker commonly have a fragipan.

Included with this soil in mapping are small areas of Lowell and Guernsey soils. Lowell soils are more clayey than the Westgate soil. Also included are Upshur soils, which are in a few areas where the mantle of silt is thin. Included soils make up about 20 percent of most delineations.

Permeability is moderate in the upper part of the subsoil in the Westgate soil and slow in the lower part. Runoff is medium. Available water capacity is high. The content of organic matter is moderately low in the surface layer. The root zone is deep. The water table is perched in the lower part of the subsoil in late winter and in spring and during other wet periods. The capacity to store and release plant nutrients is moderate. The potential for frost action is high. The shrink-swell potential is high in the lower part of the subsoil.

Most areas are used as cropland or pasture.

This soil is well suited to cultivated crops, including specialty crops. The hazard of erosion is moderate in cultivated areas. If the soil is cultivated, surface crusting after rains reduces the rate of water infiltration and retards the emergence of seedlings. Using a system of conservation tillage, such as no-till farming, that leaves crop residue on the surface, including grasses and legumes in the cropping system, planting cover crops, tilling on the contour, stripcropping, and establishing grassed waterways reduce the hazard of erosion. Limiting fieldwork when the surface layer and subsoil are too wet helps to minimize compaction. Subsurface drains can reduce wetness in scattered low or seepy areas.

This soil is well suited to hay and pasture. It is suited to a wide variety of forage plants. Acidity in the root zone is a limitation that affects some legumes. Frost heave can damage deep-rooted legumes, especially in pure stands. Leaving a protective cover of vegetation on the surface in the fall and including grasses in the seeding can reduce the damage caused by frost heave. If the soil is plowed, the hazard of erosion is moderate. Seeding companion crops, adding mulch, or using no-till seeding methods reduces the hazard of erosion.

This soil is well suited to timber production. No major limitations affect the planting or growth of trees. The soil has low strength when wet and cannot support heavy equipment. Spreading aggregate on haul roads or log landings helps to stabilize the surface. Removing vines and the less desirable trees and shrubs helps to control plant competition.

This soil is only moderately suited to use as a site for buildings. The seasonal wetness is a limitation, especially on sites for buildings with basements. The high shrink-swell potential in the lower part of the subsoil also is a limitation. Installing drains around footings can lower the water table. Reinforcing walls with concrete, supporting the walls with a large spread footing, and backfilling around foundations with granular material that has a low shrink-swell potential help to prevent the damage caused by shrinking and swelling.

This soil is only moderately suited to use as a site for septic tank absorption fields. The seasonal wetness and the restricted permeability in the lower part of the subsoil are limitations. Perimeter drains can reduce the wetness by lowering the water table. Enlarging the absorption field or using a double field helps to overcome the restricted permeability.

There are few natural pond sites. Excavated ponds are likely to hold water if the excavations do not extend below the clayey beds into the siltstone. Onsite investigation is needed to determine the thickness of the clayey beds.

The land capability classification is IIe. The pasture and hayland suitability group is A-6. The woodland ordination symbol is 4A.

WmC2—Westgate silt loam, 6 to 15 percent slopes, eroded. This deep, strongly sloping, moderately well drained soil is on dissected benches, knolls, and shoulder slopes on ridgetops. Most areas are long and narrow. Slopes are mainly smooth, but a few areas are dissected by small drainageways. Erosion has removed part of the original surface layer. Most areas are 5 to 30 acres in size.

Typically, the surface layer is brown, friable silt loam about 8 inches thick. The subsoil is about 50 inches thick. The upper part is yellowish brown and brown, friable silt loam and firm silty clay loam. The lower part is dark reddish brown, firm clay and silty clay. The underlying material is dark reddish brown, firm shaly silty clay loam and olive siltstone about 17 inches thick. Soft, weathered shale bedrock is at a depth of about 75 inches. In some areas the subsoil has less clay in the lower part.

Included with this soil in mapping are small areas of Guernsey, Upshur, and Zanesville soils. The moderately well drained Guernsey soils have more clay in the upper part of the subsoil than the Westgate soil. The well drained Upshur soils have a thinner mantle of silt than the Westgate soil. Zanesville soils have a fragipan. Included soils make up about 20 percent of most delineations.

Permeability is moderate in the upper part of the subsoil in the Westgate soil and is slow in the lower part. Runoff is rapid. Available water capacity is high. The content of organic matter is moderately low in the surface layer. The root zone is deep. The water table is perched in the lower part of the subsoil in late winter and in spring and during other wet periods. The shrink-swell potential is high in the lower part of the subsoil. The potential for frost action is high. The capacity to store and release plant nutrients is moderate.

Most areas are used as cropland. Some areas are used as pasture. A few areas are wooded.

This soil is only moderately suited to cultivated crops. Many areas are significantly eroded, and controlling further erosion is the main management concern. The hazard of erosion is severe in cultivated areas. If the soil is cultivated, surface crusting after rains reduces the rate of water infiltration and retards the emergence of seedlings. Using a system of conservation tillage, such as no-till farming, that leaves crop residue on the surface, including grasses and legumes in the cropping system, planting cover crops, tilling on the contour, stripcropping, and establishing grassed waterways reduce the hazard of erosion. Limiting fieldwork when the surface layer and subsoil are too wet helps to minimize compaction. Using subsurface drains in seepy areas increases crop production in most years.

This soil is well suited to hay and pasture. It is suited to a wide variety of forage plants. Acidity in the root zone is a limitation that affects some legumes. Frost heave can damage deep-rooted legumes, especially in pure stands. Leaving a protective cover of vegetation on the surface in the fall and including grasses in the seeding mixture can minimize the damage caused by frost heave. If the soil is plowed, the hazard of erosion is moderate. Seeding companion crops, adding mulch, or using no-till seeding methods reduces the hazard of erosion.

This soil is well suited to timber production. No major limitations affect the planting or growth of trees. The soil has low strength when wet and cannot support heavy equipment. Spreading aggregate on haul roads or log landings helps to stabilize the surface. Plant competition can be controlled by removing vines and the less desirable trees and shrubs.

This soil is only moderately suited to use as a site for buildings because of the slope, the seasonal wetness, and the high shrink-swell potential. Backfilling along foundations with material that has a low shrink-swell potential and reinforcing walls and foundations can minimize the damage caused by shrinking and swelling. Installing drains around footings helps to control the seasonal wetness. Maintaining as much plant cover as possible and reseeding or mulching can help to control erosion on construction sites.

This soil is poorly suited to use as a site for septic tank absorption fields because of the slope, the seasonal wetness, and the restricted permeability. Perimeter drains can be used to lower the seasonal high water table. The absorption of effluent can be improved by enlarging the absorption field or by using a double absorption field. Laying the distribution lines across the slope can prevent the surfacing of effluent.

Areas where this soil is on both sides of a small draw have some potential as pond sites. Care should be taken not to excavate into siltstone below the clay beds. Onsite investigation is needed to determine the thickness of the clay beds.

This soil is recognized as farmland of local importance. The land capability classification is IIIe. The pasture and hayland suitability group is A-6. The woodland ordination symbol is 4A.

WtC2—Westmoreland silt loam, 8 to 15 percent slopes, eroded. This deep, strongly sloping, well drained soil is on knolls and shoulder slopes on ridgetops. Areas of this soil also occur as narrow bands around hillsides. Slopes are generally smooth, but some are dissected by small drainageways. Erosion has removed part of the original surface layer. Most areas range from 2 to 20 acres in size.

Typically, the surface layer is dark grayish brown, friable silt loam about 6 inches thick. The subsoil is about 30 inches thick. The upper part is brown, firm silty clay loam; the next part is yellowish brown, firm clay loam; and the lower part is brown, firm channery and very channery clay loam. Below this is a thin layer of soft, weathered siltstone. Hard siltstone bedrock is at a depth of about 40 inches. In some areas the soil has a thicker mantle of silt. Severely eroded areas have a few gullies and have a higher content of coarse fragments in the surface layer. In places the soil is moderately deep over bedrock.

Included with this soil in mapping are areas of the moderately well drained Coshocton soils. These soils are mainly on the lower parts of slopes. They make up about 20 percent of most delineations.

Permeability is moderate in the Westmoreland soil. Runoff is rapid. Available water capacity is low. The content of organic matter is moderately low in the surface layer. The root zone is deep. The capacity to store and release plant nutrients is moderate.

Most areas are used as cropland or pasture. Corn, small grain, and hay are the principal crops. Some areas are wooded.

This soil is only moderately suited to cultivated crops. Many areas are eroded, and controlling further erosion is the main management concern. The hazard of erosion is severe in cultivated areas. Improving fertility and conserving moisture also are management concerns. The soil dries rapidly and warms up early in spring. If the soil is cultivated, surface crusting after rains reduces the rate of water infiltration and retards the emergence of seedlings. Using a system of conservation tillage, such as no-till farming, that leaves crop residue on the surface helps to control erosion and conserves moisture. Including grasses and legumes in the cropping system, planting cover crops, tilling on the contour, stripcropping, and establishing grassed waterways also reduce the hazard of erosion. Limiting fieldwork when the surface layer and subsoil are too wet helps to minimize compaction.

This soil is well suited to hay and pasture. It is suited to a wide variety of forage plants. If the soil is plowed, the hazard of erosion is moderate. Seeding companion crops, adding mulch, or using no-till seeding methods reduces the hazard of erosion.

This soil is well suited to timber production. No major limitations affect the planting or growth of trees. The soil has low strength when wet and cannot support heavy equipment. Spreading aggregate on haul roads or log landings helps to stabilize the surface. Plant competition can be controlled by removing vines and the less desirable trees and shrubs.

This soil is well suited to use as a site for buildings, but the slope and the depth to bedrock are management concerns. Removing as little vegetation as possible, mulching, or establishing a temporary plant cover helps to control erosion on construction sites. Building local roads and streets on the contour and seeding road cuts reduce the hazard of erosion. Because of the limited depth to bedrock in some areas, basement excavations are likely to extend into the upper layers of rock. In most areas these layers are weathered bedrock, which can be excavated with power equipment.

This soil is moderately suited to use as a site for septic tank absorption fields. The slope, the depth to bedrock, and the restricted permeability are management concerns. Enlarging the absorption field helps to overcome the restricted permeability. Using shallow leach lines that are covered with suitable material helps to overcome the limited depth to bedrock. Laying the leach lines on the contour helps to prevent the surfacing of effluent.

Ponds can be developed in some of the drainageways that cross areas of this soil. Excessive seepage is the main hazard if excavations extend into layers of porous or shattered rock. Careful onsite investigation is needed to determine the depth to bedrock.

This soil is recognized as farmland of local importance. The land capability classification is IIIe. The pasture and hayland suitability group is A-1. The woodland ordination symbol is 4A.

WtD2—Westmoreland silt loam, 15 to 25 percent slopes, eroded. This deep, moderately steep, well drained soil is on nose slopes, side slopes, and dissected upland hillsides. Slopes are broken by many small drainageways. Erosion has removed part of the original surface layer. Gullies and scars are common. Most areas are long and narrow or oblong and range from 5 to 80 acres in size.

Typically, the surface layer is dark grayish brown, friable silt loam about 3 inches thick. The subsurface layer is grayish brown and yellowish brown, friable silt loam about 8 inches thick. The upper part of the subsoil is yellowish brown and dark yellowish brown, firm channery silty clay loam about 21 inches thick. The lower part is brown very channery silty clay loam about 6 inches thick. The underlying material is about 12 inches thick. It is brown very channery silt loam and soft, weathered siltstone. Hard siltstone bedrock is at a depth of about 50 inches. Some areas are severely eroded, and a few areas are not eroded. Stones and gullies are common in the severely eroded areas. In areas on narrow ridges, the mantle of silt is thicker. In areas where sandstone is dominant, the surface layer and subsoil are more sandy. As much as one-third of some areas is moderately deep over bedrock. The lower parts of slopes are generally much deeper over bedrock.

Included with this soil in mapping are small areas of Berks and Coshocton soils. The moderately deep Berks soils are on the steeper parts of slopes. The moderately well drained Coshocton soils are on the narrow, less sloping benches. Seeps and springs are in areas of the Coshocton soils. Also included are areas in the flood pools of the Dillon Lake dam and the Wills Creek dam that are subject to controlled flooding. Included areas make up about 20 percent of most delineations.

Permeability is moderate in the Westmoreland soil. Runoff is rapid. Available water capacity is low. The content of organic matter is moderately low in the surface layer. The root zone is deep. The capacity to store and release plant nutrients is moderate.

Most areas are used as woodland or pasture. A few areas are cultivated. Some wooded areas are grazed.

This soil is poorly suited to cultivated crops. Many areas are eroded, and controlling further erosion is the main management concern. If the soil is cultivated, the hazard of erosion is very severe. Maintaining a permanent plant cover is the best means of controlling erosion. Improving fertility and conserving moisture also are management concerns. If the soil is cultivated, surface crusting after rains reduces the rate of water infiltration and retards the emergence of seedlings. Using a system of conservation tillage, such as no-till farming, that leaves crop residue on the surface, including grasses and legumes in the cropping system, planting cover crops, tilling on the contour, stripcropping, and establishing grassed waterways reduce the hazard of erosion. Conservation tillage systems also conserve moisture. Limiting fieldwork when the surface layer and subsoil are too wet helps to minimize compaction.

This soil is moderately suited to hay and pasture. It is suited to a wide variety of forage plants. If the soil is plowed, the hazard of erosion is moderate. Seeding companion crops, adding mulch, or using no-till seeding methods reduces the hazard of erosion.

This soil is only moderately suited to timber production. The aspect of the slope affects the planting and growth of trees. Coves and north- and east-facing slopes are the best woodland sites. They have cooler temperatures and more available water than other sites because they are less exposed to the sun and prevailing winds. The soil has low strength when wet and cannot support heavy equipment. Spreading aggregate on haul roads or log landings helps to stabilize the surface. The slope limits the use of planting and logging equipment. Establishing roads and skid trails on the contour, establishing water bars, and maintaining a vegetative cover help to control erosion. Removing vines and the less desirable trees and shrubs helps to control plant competition.

This soil is only moderately suited to use as a site for buildings. The slope is the main management concern. Designing the buildings so that they conform to the contour of the land reduces the need for excavation and land shaping. Removing as little vegetation as possible, adding mulch, and establishing a temporary plant cover help to control erosion on construction sites. Building local roads and streets on the contour and seeding road cuts reduce the hazard of erosion. Because of the limited depth to bedrock in some places, basement excavations may extend into the upper layers of rock. In most areas these layers are weathered and can be excavated with power equipment.

This soil is poorly suited to use as a site for septic tank absorption fields. The slope is the major management concern. Installing leach lines on the contour helps to prevent the surfacing of effluent. Enlarging the absorption field helps to overcome the restricted permeability.

Draws in areas of this soil have some potential as sites for ponds. Excessive seepage is the main hazard if excavations extend into layers of porous or shattered rock. Careful onsite investigation is needed.

The land capability classification is IVe. The pasture and hayland suitability group is A-2. The woodland ordination symbol is 4R.

WtE—Westmoreland silt loam, 25 to 40 percent slopes. This deep, steep, well drained soil is on dissected hillsides. Slopes are long and complex and have many intermittent drainageways that form a dendritic pattern. Slopes are both convex and concave. They have spurs, ridges, and crests in convex areas, and they have coves, ravines, and hollows in concave areas. Outcrops of siltstone and sandstone are common along streams. Individual areas of this soil range from 10 to 500 acres in size.

Typically, the surface and subsurface layers are very dark grayish brown and brown, friable silt loam. They have a combined thickness of about 9 inches. The subsoil is about 36 inches thick. The upper part is yellowish brown, friable and firm silt loam, and the lower part is brown, friable channery silt loam. The underlying material is firm, brown silty clay loam about 15 inches thick. Soft, weathered, light olive brown siltstone bedrock is at a depth of about 60 inches. In some areas the soil is moderately deep over bedrock. In some places the subsoil is channery sandy loam or loamy sand. In other places the surface layer is sandy loam.

Included with this soil in mapping are small areas of Wellston soils, the moderately deep Berks soils, and the moderately well drained Clarksburg and Coshocton soils. Wellston and Berks soils are on shoulders and spurs. Wellston soils are more silty than the Westmoreland soil. Clarksburg and Coshocton soils are on foot slopes. They formed in colluvium. Also included are areas in the flood pools of the Dillon Lake dam and the Wills Creek dam that are subject to controlled flooding. Included areas make up about 20 percent of most delineations.

Permeability is moderate in the Westmoreland soil. Runoff is very rapid. Available water capacity is moderate. The content of organic matter is moderate in the surface layer. The root zone is deep. The capacity to store and release plant nutrients is moderate. The shrink-swell potential is moderate in the subsoil.

Most areas are wooded. Many areas are old pastures that are reverting to brush and trees. A few areas that have smooth slopes are used for hay.

This soil is generally unsuited to cultivated crops because of the slope and a very severe hazard of erosion.

This soil is poorly suited to hay and pasture. The slope restricts the use of farm equipment. A wide variety of forage plants can grow on this soil, but seeding them and applying fertilizer are difficult. If the soil is plowed, the hazard of erosion is very severe. Seeding companion crops, adding mulch, or using no-till seeding methods reduces the hazard of erosion.

This soil is only moderately suited to timber production. The aspect of the slope affects the planting and growth of trees. The slope limits the use of planting and logging equipment. Coves and north- and east-facing slopes are the best woodland sites. They have cooler temperatures and more available water than other sites because they are less exposed to the sun and prevailing winds. The soil has low strength when wet and cannot support heavy equipment. Spreading aggregate on haul roads or log landings helps to stabilize the surface. Establishing roads and skid trails on the contour, establishing water bars, and maintaining a vegetative cover help to control erosion. Removing vines and the less desirable trees and shrubs helps to control plant competition.

This soil is poorly suited to use as a site for buildings because of the slope. Excavations for buildings commonly extend into rock and can increase the hazard of slippage. Sites for structures that are built into the side of a hill or bank commonly require less excavation than other sites. Removing as little vegetation as possible can help to control erosion on construction sites.

This soil is generally unsuited to use as a site for septic tank absorption fields because of the slope. Effluent is likely to surface and pollute streams.

Ponds can be developed in some of the draws that cross areas of this soil. Excessive seepage is the main hazard if excavations extend into layers of porous or shattered rock. Careful onsite investigation is needed to determine the location of the rock layers. The bottom of the draws is sloping, and a high fill commonly is needed to create an impoundment of any size.

The land capability classification is VIe. The pasture and hayland suitability group is A-3. The woodland ordination symbol is 4R.

WuC2—Westmoreland-Guernsey silt loams, 8 to 15 percent slopes, eroded. These deep, strongly sloping soils are on dissected ridgetops and hillsides and on benches. The Westmoreland soil is on moderately steep slopes, and the Guernsey soil is on narrow, gently sloping benches. The two soils occur as alternating bands associated with strata of different kinds of bedrock. In some places they are intermingled. Slopes are complex and have knolls, shoulders, and coves. Erosion has removed most of the original surface layer, and gullies and scars are common along intermittent drainageways. Seep spots are numerous. Most areas of these soils range from 3 to 50 acres in size. They are about 45 percent Westmoreland soil and 35 percent Guernsey soil.

The Westmoreland soil is well drained. Typically, the surface layer is dark brown, friable silt loam about 5 inches thick. The subsoil is yellowish brown, firm channery silty clay loam about 42 inches thick. The underlying material is yellowish brown, very firm very channery silt loam about 10 inches thick. Siltstone bedrock is at a depth of about 57 inches. In many areas the bedrock is at a depth of less than 40 inches. In some places on narrow ridges, the mantle of silt is thicker.

The Guernsey soil is moderately well drained. Typically, the surface layer is dark grayish brown, friable silt loam about 6 inches thick. The subsoil is yellowish brown, firm silty clay loam and silty clay about 30 inches thick. It is mottled. The underlying material to a depth of 60 inches or more is light olive gray, very firm shaly silty clay loam. In severely eroded areas the surface layer is silty clay loam.

Included with these soils in mapping are small areas of the moderately well drained Coshocton, Westgate, and Keene soils. These included soils are wetter than the Westmoreland soil and have a lower content of clay than the Guernsey soil. They make up about 20 percent of most delineations.

Permeability is moderate in the Westmoreland soil and is moderately slow or slow in the Guernsey soil. Runoff is medium or rapid on the Westmoreland soil and is rapid on the Guernsey soil. Available water capacity is moderate in both soils. The content of organic matter is moderately low in the surface layer. The root zone is deep. A seasonal high water table is perched in the lower part of the subsoil of the Guernsey soil during extended wet periods. The capacity to store and release plant nutrients is moderate in the Westmoreland soil and high in the Guernsey soil. The shrink-swell potential is high in the Guernsey soil.

Most areas are used as cropland. Many areas are used as pasture. Some areas support trees. Corn, small grain, and hay are the main crops.

These soils are only moderately suited to cultivated crops. Many areas are significantly eroded, and controlling further erosion is the main management concern. The hazard of erosion is severe in cultivated areas. Improving fertility and conserving moisture also are management concerns. Tilth is fair or poor in eroded areas of the Guernsey soil. If the soils are cultivated, surface crusting after rains reduces the rate of water infiltration and retards the emergence of seedlings. Using a system of conservation tillage, such as no-till farming, that leaves crop residue on the surface, including grasses and legumes in the cropping system, planting cover crops, tilling on the contour, stripcropping, and establishing grassed waterways reduce the hazard of erosion. Limiting fieldwork when the surface layer and subsoil are too wet helps to minimize compaction. Using subsurface drains in seepy areas increases crop production in most years.

These soils are well suited to hay and pasture. A wide variety of forage plants can be grown. Frost heave in areas of the Guernsey soil can damage deep-rooted legumes, especially in pure stands. Leaving a protective cover of vegetation on the surface in the fall or seeding a grass-legume mixture can minimize the damage caused by frost heave. If the soils are plowed, the hazard of erosion is moderate. Seeding companion crops, adding mulch, or using no-till seeding methods reduces the hazard of erosion.

These soils are well suited to timber production. No major limitations affect the planting or growth of trees. The soils have low strength when wet and cannot support heavy equipment. Spreading aggregate on haul roads or log landings helps to stabilize the surface. Adequate soil-root contact should be maintained in the more eroded areas of the Guernsey soil, where the surface layer is silty clay loam. Removing vines and the less desirable trees and shrubs helps to control plant competition.

These soils are only moderately suited to use as sites for buildings. Bedrock is at a depth of only 40 inches in some areas of the Westmoreland soil. Basement excavations in these areas are likely to extend into weathered bedrock, but the bedrock can be excavated with power equipment. The shrink-swell potential and the seasonal wetness of the Guernsey soil are limitations on sites for dwellings. Removing as little vegetation as possible, mulching, or establishing a temporary plant cover helps to control erosion on construction sites. Waterproofing basement walls and installing drains at the base of footings help to keep basements dry. Reinforcing walls, supporting the walls with a large spread footing, and backfilling around foundations with granular material that has a low shrink-swell potential help to prevent the damage caused by shrinking and swelling. Cutting and filling increase the hazard of hillside slippage in areas of the Guernsey soil, but installing artificial drains reduces this hazard. If possible, buildings should be constructed in areas of the Westmoreland soil.

These soils are moderately suited or poorly suited to use as sites for septic tank absorption fields. The Westmoreland soil is better suited to septic tank absorption fields than the Guernsey soil. Installing the leach lines on the contour helps to prevent the surfacing of effluent. Using suitable fill material helps to overcome the limited depth to bedrock in areas of the

Westmoreland soil. Perimeter drains can reduce the wetness in areas of the Guernsey soil. Enlarging the absorption field helps to overcome the restricted permeability, especially in areas of the Guernsey soil.

Ponds can be developed in some of the drainageways and seeps in areas of these soils. If excavation exposes layers of porous or shattered rock, excessive seepage is likely. Onsite investigation is needed to determine the location and depth of the rock layers. The soil material is generally good for fill, but the Guernsey soil packs well only if it is used at the proper moisture content.

These soils are recognized as farmland of local importance. The land capability classification is IIIe. The pasture and hayland suitability group is A-1 for the Westmoreland soil and A-6 for the Guernsey soil. The woodland ordination symbol is 4A for both soils.

WuD2—Westmoreland-Guernsey silt loams, 15 to 25 percent slopes, eroded. These deep, moderately steep soils are on dissected hillsides and benches. Slopes are irregular and have many gullies and landslide scars. Erosion has removed part of the original surface layer. Seeps are common. The two soils occur as alternating bands that are associated with different bedrock strata. Most areas are long and narrow or are oblong and range from 10 to 50 acres in size. They are about 45 percent Westmoreland soil and 35 percent Guernsey soil.

The Westmoreland soil is well drained. Typically, the surface layer is dark brown, friable silt loam about 9 inches thick. The subsoil is about 31 inches thick. The upper part is yellowish brown, friable silty clay loam, channery silty clay loam, and channery silt loam. The lower part is yellowish brown, mottled, friable channery clay loam. The underlying material is brown, mottled, firm very channery clay loam about 20 inches thick. Siltstone bedrock is at a depth of about 60 inches.

The Guernsey soil is moderately well drained. Typically, the surface layer is dark brown, friable silt loam about 8 inches thick. The subsoil is about 44 inches thick. It is mottled. The upper part is brown, firm clay loam and silty clay. The lower part is yellowish brown, firm silty clay loam and silty clay. The underlying material is light olive brown, firm channery silty clay loam about 3 inches thick. Siltstone bedrock is at a depth of about 55 inches. In some areas the depth to bedrock is greater. In many severely eroded areas, the surface layer is silty clay loam.

Included with these soils in mapping are small areas of Berks, Lowell, and Upshur soils. The moderately deep Berks soils are on the upper part of hillsides. Lowell and Upshur soils are on benches. They have more clay than the Westmoreland soil and are better drained than the Guernsey soil. Also included are areas in the flood pools of the Dillon Lake dam and the Wills Creek dam that are subject to controlled flooding. Included areas make up about 20 percent of most delineations.

Permeability is moderate in the Westmoreland soil and moderately slow or slow in the Guernsey soil. Runoff is rapid on the Westmoreland soil and very rapid on the Guernsey soil. Available water capacity is moderate in both soils. The content of organic matter is moderately low in the surface layer. The root zone is deep. A seasonal high water table is perched in the lower part of the subsoil in areas of the Guernsey soil during extended wet periods. The capacity to store and release plant nutrients is moderate in both soils.

Most areas are used as pasture. Many areas are wooded. A few areas are used for cultivated crops or for hay.

These soils are poorly suited to cultivated crops. Many areas are significantly eroded, and controlling further erosion is the main management concern. The hazard of erosion is very severe in cultivated areas. Improving fertility and conserving moisture also are management concerns. Maintaining a permanent plant cover is the best means of controlling erosion. If the soils are cultivated, surface crusting after rains reduces the rate of water infiltration and retards the emergence of seedlings. Tilth is fair or poor in the more eroded areas of the Guernsey soil. Using a system of conservation tillage, such as no-till farming, that leaves crop residue on the surface, including grasses and legumes in the cropping system, planting cover crops, tilling on the contour, stripcropping, and establishing grassed waterways reduce the hazard of erosion. Limiting fieldwork when the surface layer and subsoil are too wet helps to minimize compaction. Using subsurface drains in seepy areas of the Guernsey soil increases crop production in most years.

These soils are only moderately suited to hay and pasture. Most of the commonly grown forage plants are suitable for planting. Frost heave in areas of the Guernsey soil can damage deep-rooted legumes, especially in pure stands. Leaving a protective cover of vegetation on the surface in the fall or including grasses in the seeding mixture can minimize the damage caused by frost heave. If the soils are tilled, the hazard of erosion is severe. Seeding companion crops, adding mulch, or using no-till seeding methods reduces the hazard of erosion.

These soils are only moderately suited to timber production. The slope limits the use of planting and logging equipment. The aspect of the slope affects the planting and growth of trees. Coves and north- and east-facing slopes are the best woodland sites. They have cooler temperatures and more available water than other sites because they are less exposed to the sun and prevailing winds. The soils have low strength when wet and cannot support heavy equipment. Spreading aggregate on haul roads or log landings helps to stabilize the surface. Establishing roads and skid trails on the contour, establishing water bars, and maintaining a vegetative cover help to control erosion. Using planting techniques that spread the roots of seedlings and that increase soil-root contact can reduce the seedling mortality rate in areas of the Guernsey soil. Using seedlings that have been transplanted once or adding mulch can reduce the seedling mortality rate on south-facing slopes. Removing vines and the less desirable trees and shrubs helps to control plant competition.

These soils are poorly suited to use as sites for buildings because of the slope and the hazard of slippage. The high shrink-swell potential is also a limitation in areas of the Guernsey soil. The Westmoreland soil is better suited to building sites than the Guernsey soil. Removing as little vegetation as possible, mulching, and establishing a temporary plant cover can reduce the hazard of erosion on construction sites. Bedrock is at a depth of only 40 inches in some areas of the Westmoreland soil. These areas are better suited to dwellings without basements than to dwellings with basements. Reinforcing walls with concrete, supporting the walls with a large spread footing, and backfilling around foundations with material that has a low shrink-swell potential help to prevent the damage caused by shrinking and swelling in areas of the Guernsey soil. Cutting and filling increase the hazard of hillside slippage in areas of the Guernsey soil, but installing drains in the seepy areas reduces this hazard. Buildings should be designed so that they conform to the natural slope of the land.

The Westmoreland soil is poorly suited to use as a site for septic tank absorption fields, and the Guernsey soil is generally unsuited. The slope is a limitation on both soils, and the seasonal wetness and the restricted permeability are limitations in areas of the Guernsey soil. Installing leach lines on the contour helps to prevent the surfacing of effluent. Using suitable fill material helps to overcome the limited depth to bedrock in areas of the Westmoreland soil. Perimeter drains can reduce the wetness in areas of the Guernsey soil. Enlarging the absorption field helps to overcome the restricted permeability.

Ponds can be developed in some of the small draws in areas of these soils. The bottom of these draws has a considerable grade, and a high fill is needed to create an impoundment of any size. The soil material is generally good fill if packed well and used under the proper moisture conditions. Layers of porous or shattered rock that permit excessive seepage are on the sides of many draws. Careful onsite investigation is needed to determine the location and depth of these rock layers.

The land capability classification is IVe. The pasture and hayland suitability group is A-2. The woodland ordination symbol is 4R.

WuE2—Westmoreland-Guernsey silt loams, 25 to 40 percent slopes, eroded. These deep, steep soils are on dissected hillsides and benches. Slopes are irregular and have many gullies and landslide scars. Erosion has removed much of the original surface layer. Seeps are common. Most areas are long and narrow and range from 20 to 120 acres in size. They are about 45 percent Westmoreland soil and 35 percent Guernsey soil. The two soils occur as alternating bands across the slope.

The Westmoreland soil is well drained. Typically, the surface layer is dark grayish brown, friable silt loam about 3 inches thick. The subsoil is yellowish brown, friable silt loam and channery silty clay loam about 40 inches thick. The underlying material is brown, friable very channery silt loam about 17 inches thick. Siltstone bedrock is at a depth of about 60 inches.

The Guernsey soil is moderately well drained. Typically, the surface layer is dark grayish brown, friable silt loam about 5 inches thick. The subsoil is about 45 inches thick. The upper part is yellowish brown, friable silty clay loam. The lower part is yellowish brown and grayish brown, mottled, firm silty clay. The underlying material to a depth of 60 inches or more is light gray, firm silty clay loam.

Included with these soils in mapping are small areas of Berks, Rigley, Clarksburg, Omulga, Glenford, Newark, and Lobdell soils. The moderately deep Berks soils and the deep Rigley soils are on the upper part of hillsides. Rigley soils have less clay, more sandstone fragments, and more sand in the subsoil than the Westmoreland and Guernsey soils. The moderately well drained Clarksburg, Omulga, and Glenford soils are on foot slopes. Newark and Lobdell soils are on narrow flood plains and are subject to flooding. Included soils make up about 20 percent of most delineations.

Permeability is moderate in the Westmoreland soil and moderately slow or slow in the Guernsey soil. Runoff is very rapid on both soils. Available water capacity is moderate. The content of organic matter is moderately low in the surface layer. The root zone is deep. A seasonal high water table is perched in the lower part of the subsoil of the Guernsey soil during extended wet periods.

Most areas are wooded. Some areas are used as pasture.

These soils are generally unsuited to cultivated crops and hay because of the slope and a very severe hazard of erosion. Maintaining a permanent plant cover on the surface is the best means of controlling erosion.

These soils are poorly suited to pasture. The slope limits the use of farm equipment. A wide variety of forage plants can be grown, but seeding and applying fertilizer are difficult because of the slope. Frost heave in areas of the Guernsey soil can damage deep-rooted legumes, especially in pure stands. Leaving a protective cover of vegetation on the surface in the fall or including grasses in the seeding mixture can minimize the damage caused by frost heave. If the soils are tilled, the hazard of erosion is very severe. Seeding companion crops, adding mulch, or using no-till seeding methods can reduce the hazard of erosion.

These soils are only moderately suited to timber production. The aspect of the slope affects the planting and growth of trees. Coves and north- and east-facing slopes are the best woodland sites. They have cooler temperatures and more available water than other sites because they are less exposed to the sun and prevailing winds. The slope limits the use of planting and logging equipment. Also, the soils have low strength when wet and cannot support heavy equipment. Spreading aggregate on haul roads or log landings helps to stabilize the surface. Establishing roads and skid trails on the contour, establishing water bars, and maintaining a vegetative cover help to control erosion. Using planting techniques that spread the roots of seedlings and that increase soil-root contact can reduce the seedling mortality rate in areas of the Guernsey soil. Using seedlings that have been transplanted once or adding mulch can reduce the seedling mortality rate on south-facing slopes. Removing vines and the less desirable trees and shrubs helps to control plant competition.

These soils are generally unsuited to use as sites for buildings or for septic tank absorption fields because of the slope. The seasonal wetness, a hazard of slippage, the restricted permeability, and the high shrink-swell potential of the Guernsey soil also are limitations. Cutting and filling increase the hazard of hillside slippage in areas of the Guernsey soil. Installing subsurface drains in the seepy areas reduces the hazard of slippage.

Ponds can be developed in some of the draws in areas of these soils. The bottom of these draws has a considerable grade, and a high fill commonly is needed to create an impoundment of any size. The soil material generally is good fill if packed and used at the right moisture content. Layers of porous or shattered rock that permit excessive seepage are on the sides of many draws. Onsite investigation is needed to determine the location of these layers.

The land capability classification is VIe. The pasture and hayland suitability group is A-3. The woodland ordination symbol is 4R.

WvD—Westmoreland-Urban land complex, 15 to 35 percent slopes. This map unit consists of areas of Urban land and Westmoreland soil that are intermingled in such an intricate pattern that they cannot be mapped separately. The deep, moderately steep and steep, well drained Westmoreland soil is on dissected hillsides. It is dominant in the open areas. The Urban land consists of areas that are covered by buildings or pavement. Because of the pattern of urban development, most areas of this map unit are rectangular and range in size from 10 to 100 acres. They are about 50 percent Westmoreland soil and 20 percent Urban land.

Typically, the surface layer of the Westmoreland soil is dark brown, friable silt loam about 9 inches thick. The subsoil is about 31 inches thick. The upper part is yellowish brown, friable silty clay loam, channery silty clay loam, and channery silt loam. The lower part is yellowish brown, mottled, friable channery clay loam. The underlying material is brown, mottled, firm very channery clay loam about 20 inches thick. Siltstone bedrock is at a depth of about 60 inches. In some places the surface layer and the subsoil are channery sandy loam.

In the areas of Urban land, the surface is impermeable because of concrete or bituminous pavement and building rooftops. Commonly, a layer of coarse aggregate, crushed limestone, gravel, or sand about 6 to 12 inches thick is beneath the surface. The underlying material is generally highly compacted earthfill or is excavated material weathered from siltstone or shale.

Included in mapping are small areas of Coshocton, Berks, and Guernsey soils. The moderately well drained Coshocton soils are on the lower concave slopes and in coves. The moderately deep Berks soils are on steep slopes. The moderately well drained Guernsey soils are more clayey in the subsoil than the Westmoreland soil. Also included are many areas of the loamy Udorthents that have been graded or excavated to such an extent that soil layers cannot be distinguished. Included areas make up about 30 percent of most delineations.

Permeability is moderate in the Westmoreland soil. Runoff is rapid on the Westmoreland soil. It is very rapid in areas of Urban land. Available water capacity is moderate in the Westmoreland soil. The content of organic matter is moderately low in the surface layer.

Plant growth and water infiltration are restricted in areas of Urban land.

Many areas are used for residential development. Undeveloped areas are used as woodland or pasture.

Open areas of the Westmoreland soil are generally unsuited to cultivation because of the slope and a very severe hazard of erosion. Maintaining a permanent plant cover is the best means of controlling erosion.

Open areas of the Westmoreland soil are poorly suited to pasture. A wide variety of adapted forage plants can be grown, but seeding and applying fertilizer are difficult because of the slope. If the soil is plowed, the hazard of erosion is very severe. Seeding companion crops, adding mulch, or using no-till seeding methods reduces the hazard of erosion.

Open areas of this map unit are only moderately suited to timber production. The aspect of the slope affects the planting and growth of trees. Coves and north- and east-facing slopes are the best woodland sites. They have cooler temperatures and more available water than other sites because they are less exposed to the sun and prevailing winds. The Westmoreland soil has low strength when wet and cannot support heavy equipment. Spreading aggregate on haul roads or log landings helps to stabilize the surface. The slope limits the use of planting and logging equipment. Establishing roads and skid trails on the contour, establishing water bars, and maintaining a vegetative cover help to control erosion. Using planting techniques that spread the roots of seedlings and that increase soil-root contact can reduce the seedling mortality rate. Using seedlings that have been transplanted once or adding mulch can reduce the seedling mortality rate on south-facing slopes. Removing vines and the less desirable trees and shrubs helps to control plant competition.

Open areas of the Westmoreland soil are poorly suited to use as sites for buildings because of the slope. Erosion on construction sites can be severe. Sites for structures that are built into the side of a hill or bank require less excavation and are better suited than other sites.

The Westmoreland soil is generally unsuited to use as a site for septic tank absorption fields because of the slope. Sanitary facilities should be connected to central sewers if possible, or an aerator or other alternative system should be used.

The suitability of areas of this map unit for ponds is extremely variable. Detailed onsite investigation is needed. Sites below areas of urban development commonly receive more runoff than those below undeveloped areas. The location of a proposed site should be considered when ponds are designed.

No land capability classification, pasture and hayland suitability group, or woodland ordination symbol is assigned.

ZnB—Zanesville silt loam, 2 to 6 percent slopes. This deep, gently sloping, moderately well drained and well drained soil is on knolls and in saddles on ridgetops. Slopes are generally smooth and convex. Most areas range from 5 to 40 acres in size.

Typically, the surface layer is brown, friable silt loam about 7 inches thick. The subsoil is about 60 inches thick. The upper part is yellowish brown and dark yellowish brown, friable silt loam that is mottled at a depth of more than 23 inches. The next part is a compact fragipan of yellowish brown, mottled, very firm and brittle silt loam and silty clay loam. The lower part of the subsoil is brownish yellow silty clay loam and clay loam. The underlying material to a depth of 80 inches or more is yellowish brown, friable and firm loam and channery loam. In some areas the underlying material has thin layers of silty clay loam and sandy loam. In many areas, the subsoil does not have a fragipan or the fragipan is at a lower depth.

Included with this soil in mapping are areas of Alford, Aaron, Keene, Wellston, and Westgate soils. These soils are in landscape positions similar to those of the Zanesville soil. They do not have a fragipan. They make up about 20 percent of most delineations.

Permeability is moderate above the fragipan in the Zanesville soil and moderately slow or slow in the fragipan. Runoff is medium in cultivated areas. Available water capacity is moderate. The plow layer has a high content of silt and a moderately low content of organic matter. The rooting depth is mainly restricted to the layers above the fragipan. A seasonal high water table is in the lower part of the subsoil during wet periods. The capacity to store and release plant nutrients is moderate. The potential for frost action is high.

This soil is used mainly for cultivated crops. Some areas are used for residential or commercial development.

This soil is well suited to cultivated crops, including specialty crops. The hazard of erosion is moderate in cultivated areas. If the soil is cultivated, surface crusting after rains reduces the rate of water infiltration and retards the emergence of seedlings. Using a system of conservation tillage, such as no-till farming, that leaves crop residue on the surface, including grasses and legumes in the cropping system, planting cover crops, tilling on the contour, stripcropping, and establishing grassed waterways reduce the hazard of erosion. Limiting fieldwork when the surface layer and subsoil are too wet helps to minimize compaction. Subsurface drains can reduce wetness in scattered areas.

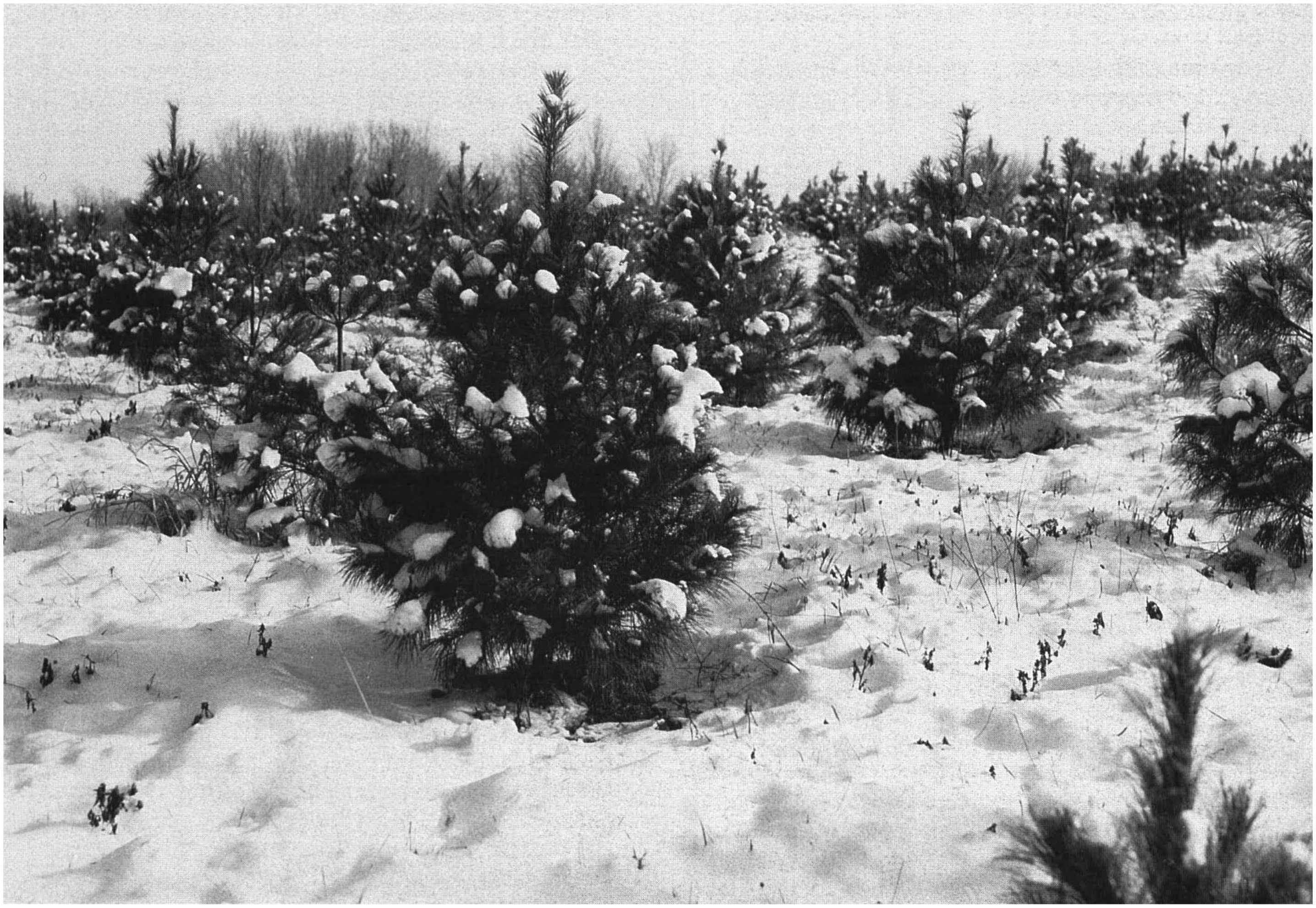

Figure 14.—White pine in an area of Zanesville silt loam, 2 to 6 percent slopes.

This soil is well suited to hay and pasture. The root development of some species is restricted by the fragipan. Frost heave can damage deep-rooted legumes, especially in pure stands. Leaving a protective cover of vegetation on the surface in the fall or seeding a grass-legume mixture can minimize the damage caused by frost heave. If the soil is plowed, the hazard of erosion is moderate. Seeding companion crops, adding mulch, or using no-till seeding methods reduces the hazard of erosion. Grazing when the surface layer is soft and wet can damage the sod and causes compaction of the surface layer.

This soil is well suited to timber production. No major limitations affect the planting or growth of trees (fig. 14). The soil has low strength when wet and cannot support heavy equipment. Spreading aggregate on haul roads or log landings helps to stabilize the surface.

This soil is only moderately suited to use as a site for buildings. Seasonal wetness is the main limitation. Installing drains around footings and coating exterior walls help to prevent wet basements. Backfilling the drains with gravel helps to intercept seepage along the top of the fragipan.

This soil is only moderately suited to use as a site for septic tank absorption fields. The restricted permeability in the fragipan and the seasonal wetness are limitations. Perimeter drains can reduce the wetness by lowering the water table. Enlarging the absorption area or installing a double absorption field system helps to overcome the restricted permeability. Included areas of Alford and Wellston soils are better sites for absorption fields.

There are few natural pond sites. The watershed area is limited because of the ridgetop landscape position of the soil. In some areas the underlying material is suitable for an excavated pond. Other areas have shattered rock. Careful onsite investigation is needed.

The land capability classification is IIe. The pasture and hayland suitability group is F-3. The woodland ordination symbol is 4A.

ZnC2—Zanesville silt loam, 6 to 15 percent slopes, eroded. This deep, strongly sloping, moderately well drained and well drained soil is on knolls and shoulder slopes on ridgetops. Slopes are long and smooth. Erosion has removed part of the original surface layer. Most areas range from 3 to 60 acres in size.

Typically, the surface layer is brown, friable silt loam about 9 inches thick. The subsoil is about 41 inches thick. It is mottled. The upper part, to a depth of about 30 inches, is yellowish brown and dark yellowish brown, friable silt loam. The lower part is a compact fragipan of yellowish brown, firm and very firm clay loam. The underlying material to a depth of 80 inches or more is yellowish brown, mottled, firm silty clay loam. In many areas the fragipan is not continuous or is at a lower depth. In other areas the lower part of the subsoil is more clayey.

Included with this soil in mapping are small areas of Alford, Wellston, Keene, Westgate, Gilpin, and Westmoreland soils. Alford, Wellston, Keene, and Westgate soils do not have a fragipan. Narrow bands of Gilpin and Westmoreland soils are on shoulder slopes or knolls. Gilpin soils are moderately deep. Westmoreland soils are more loamy than the Zanesville soil. Included soils make up about 25 percent of most delineations.

Permeability is moderate above the fragipan in the Zanesville soil and moderately slow or slow in the fragipan. Runoff is rapid. Available water capacity is moderate. The content of organic matter is low or moderately low in the surface layer. The rooting depth is mainly restricted to the layers above the fragipan. A seasonal high water table is at a depth of 2 to 3 feet during extended wet periods. The potential to store and release plant nutrients is moderate. The potential for frost action is high.

Most areas are used for cultivated crops or for hay and pasture.

This soil is only moderately suited to cultivated crops. Many areas are significantly eroded, and controlling further erosion is the main management concern. The hazard of erosion is severe in cultivated areas. Improving fertility and conserving moisture also are management concerns. If the soil is cultivated, surface crusting after rains reduces the rate of water infiltration and retards the emergence of seedlings. Using a system of conservation tillage, such as no-till farming, that leaves crop residue on the surface, including grasses and legumes in the cropping system, planting cover crops, tilling on the contour, stripcropping, and establishing grassed waterways reduce the hazard of erosion. Limiting fieldwork when the surface layer and subsoil are too wet helps to minimize compaction. Subsurface drains are beneficial in seepy areas.

This soil is well suited to hay and pasture. The root development of some species is restricted by the fragipan. Frost heave can damage deep-rooted legumes, especially in pure stands. Leaving a protective cover of vegetation on the surface in the fall or including grasses in the seeding mixture can minimize the damage caused by frost heave. If the soil is plowed, the hazard of erosion is moderate. Seeding companion crops, adding mulch, or using no-till seeding methods reduces the hazard of erosion.

This soil is well suited to timber production. No major limitations affect the planting or growth of trees. The soil has low strength when wet and cannot support heavy equipment. Spreading aggregate on haul roads or log landings helps to stabilize the surface.

This soil is only moderately suited to use as a site for buildings. The slope and the seasonal wetness are management concerns. Installing drains around footings and coating exterior basement walls help to prevent wet basements. Backfilling drains with gravel helps to intercept water seeping along the top of the fragipan. Maintaining as much vegetative cover as possible on construction sites helps to control erosion. Buildings should be designed so that they conform to the natural slope of the land.

This soil is poorly suited to use as a site for septic tank absorption fields. The restricted permeability, the seasonal wetness, and the slope are management concerns. Installing the absorption field in suitable fill material, enlarging the field, or using a double field can increase the absorption of effluent. Perimeter drains can be used to lower the seasonal high water table. Laying the leach lines across the slope helps to prevent the surfacing of effluent. Included areas of Alford and Wellston soils are better suited to use as sites for septic tank absorption fields.

Some areas where this soil is on both sides of a small draw have potential as pond sites, but the watershed area commonly is limited on these sites. The upper layers of the soil do not pack well and are poor fill. In some places the lower layers are good fill, but in other places shattered rock is within a depth of 6 feet. Careful onsite investigation is needed.

This soil is recognized as farmland of local importance. The land capability classification is IIIe. The pasture and hayland suitability group is F-3. The woodland ordination symbol is 4A.

Prime Farmland

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in meeting the Nation's short- and long-range needs for food and fiber. Because the supply of high-quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is the land that is best suited to food, feed, forage, fiber, and oilseed crops. It may be cultivated land, pasture, woodland, or other land, but it is not urban or built-up land or water areas. It either is used for food or fiber crops or is available for those crops. The soil qualities, growing season, and moisture supply are those needed for a well managed soil to produce a sustained high yield of crops in an economic manner. Prime farmland produces the highest yields with minimal expenditure of energy and economic resources, and farming it results in the least damage to the environment.

Prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation. The temperature and growing season are favorable. The level of acidity or alkalinity is acceptable. Prime farmland has few or no rocks and is permeable to water and air. It is not excessively erodible or saturated with water for long periods and is not frequently flooded during the growing season. The slope ranges mainly from 0 to 6 percent. More detailed information about the criteria for prime farmland is available at the local office of the Natural Resources Conservation Service.

More than 88,000 acres in the survey area, or about 21 percent of the total acreage, meets the soil requirements for prime farmland. Although some of this acreage requires a drainage system or protection from flooding, most of the acreage is currently used for crop production. In Muskingum County, the areas of prime farmland are mainly confined to lacustrine and outwash terraces, the flood plains along major valleys, and the broader ridgetops in the uplands. A small acreage is on benches and narrow ridgetops.

A recent trend in land use in some parts of the county has been the loss of some prime farmland to mining and to industrial and urban uses. The loss of prime farmland to other uses puts pressure on marginal lands, which generally are more erodible, droughty, and less productive and cannot be easily cultivated.

Prime farmland areas are relatively scarce in Muskingum County. Areas on the flood plains are subject to periodic flooding. Economic losses could result if these lands are converted to urban uses. The soils in glacial lake valleys have poor natural drainage and low strength. These limitations result in design problems if the land in these areas is used for buildings or for sewage disposal systems. Prime farmland in these areas is best used for agricultural production.

An alternative for land developers is the use of reclaimed strip-mine areas. These areas have potential for industrial and residential development. The land surface in some of the reclaimed areas is significantly smoother and flatter than the original surface.

The map units in the survey area that are considered prime farmland are listed in table 5. This list does not constitute a recommendation for a particular land use. The extent of each listed map unit is shown in table 4. The location is shown on the detailed soil maps at the back of this publication. The soil qualities that affect use and management are described under the heading "Detailed Soil Map Units."

Some soils that have a seasonal high water table and all soils that are frequently flooded during the growing season qualify as prime farmland only in areas where these limitations have been overcome by drainage measures or flood control. The need for these measures is indicated after the map unit name in table 5. Onsite evaluation is needed to determine whether or not these limitations have been overcome by corrective measures.

Prime farmland soils that are affected by mining are subject to special reclamation requirements, which are designed to restore the mined areas to their original productivity.

Almost 91,000 acres in Muskingum County, or about 22 percent of the total acreage, does not meet the standards for prime farmland but is considered farmland of local importance. This land may be more susceptible to erosion or flooding or may be wetter or droughtier than prime farmland. The soils in Muskingum County that are considered farmland of local importance are identified in the detailed soil map unit descriptions.

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help to prevent soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreational facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

The soils in the survey area are assigned to various interpretive groups at the end of each map unit description and in some of the tables. The groups for each map unit also are shown under the heading "Interpretive Groups," which follows the tables at the back of this survey.

Crops and Pasture

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils, including some not commonly grown in the survey area, are identified; the system of land capability classification used by the Natural Resources Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants are listed for each soil.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under the heading "Detailed Soil Map Units." Specific information can be obtained from the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

At the end of each map unit description, the soil has been assigned to a pasture and hayland suitability group. These groups are based primarily on the suitability of the soil for certain pasture species, management needs, and potential productivity. Detailed interpretations for each pasture and hayland suitability group in the county are provided in the "Technical Guide," which is available in the local office of the Natural Resources Conservation Service.

Trends in Land Use

Farming is the primary land use in Muskingum County. Only about 6 percent of the county is urban or built-up land *(23)*. In 1967, more than 92,521 acres in the survey area was used for crops and 117,767 acres was used for pasture *(34)*. Of this total, about 23,750 acres was used for row crops, mainly corn; 8,450 acres was used for close-growing crops, mainly wheat and oats; and 18,610 acres was used for hay and pasture. In 1982, about 91,000 acres was used for crops and 102,900 acres was used for pasture *(23)*.

The potential for increasing the acreage of cropland in Muskingum County is good. Approximately 3 percent of the 285,200 acres of pasture, woodland, and other land has a high potential for conversion to cropland. About 94,100 acres of potential cropland is currently used as woodland, and about 77,200 acres is pasture. About 64 percent of this reserve acreage, or about 136,200 acres, is in land capability classes III and IV, which are described under the heading "Land Capability Classification" on page 133. Good management is needed on this acreage to minimize the hazard of erosion.

Although corn is the main grain crop grown in Muskingum County, the soils and climate are suitable for grain sorghum, sunflowers, and similar crops. Wheat and oats are common close-growing crops. Barley, rye, and buckwheat could be grown, and grass seed could be produced from bromegrass, timothy, fescue, redtop, and bluegrass.

Soil Management Problems

Different kinds of soil in the survey area have different management needs. The paragraphs that follow describe the major management concerns affecting cropland and pasture in Muskingum County.

Erosion is a major management concern on more than three-fourths of the cropland and pasture in Muskingum County *(23)*. Erosion is generally a hazard in areas where slopes are more than 2 percent. The hazard of erosion increases as the slope gradient increases. Generally, the hazard of erosion in cultivated or overgrazed areas is moderate on gently sloping soils (2 to 6 percent slopes), severe on strongly sloping soils (6 to 15 percent slopes), and very severe on moderately steep to very steep soils (more than 15 percent slopes). Some soils that are susceptible to erosion have additional limitations. For example, the hazard of erosion is moderate in areas of Fitchville silt loam, 2 to 6 percent slopes, and wetness is an additional limitation.

Erosion can remove the surface layer of the soil. The surface layer is the layer that has received most of the residue from the native and cultivated plants that have grown on the soil over the years. As topsoil is removed, the more acid subsoil becomes incorporated into the surface layer through subsequent tillage. Applications of lime and fertilizer are needed to replace lost plant nutrients and maintain productivity. If the amount of annual soil loss exceeds the rate at which the soil forms, productivity and natural fertility decrease. Loss of the original topsoil is especially damaging on soils that have a high content of clay in the subsoil, such as Aaron and Guernsey soils, and on soils that have a fragipan in the subsoil that limits the rooting depth, such as Cincinnati, Omulga, and Zanesville soils.

Tilling and preparing a good seedbed are difficult on the more eroded spots in sloping areas where most of the original surface layer has been lost. Stands are poorer in these spots because less moisture is available and soil-seed contact is reduced. Severely eroded spots are common in areas of eroded soils, such as Aaron, Gilpin, and Lowell soils.

Sediment, chemical fertilizer, herbicides, and pesticides are carried downstream from eroding fields by runoff and enter waterways, streams, ponds, and lakes. The sediment can fill drainage ditches and block drainage outlets, and costly maintenance commonly is needed.

Controlling erosion protects the soil, maintains productivity, helps to prevent the pollution of streams, and improves the quality of water for municipal and recreational uses and for fish and wildlife. Management practices that help to control erosion include rotating crops; contour farming, or tilling across the slope; contour stripcropping; planting cover crops; returning crop residue to the surface; establishing grassed waterways, terraces, and diversions; and using conservation tillage methods.

Crop rotations that include cover crops, grasses, and legumes improve tilth and reduce the hazard of erosion by providing plant cover for extended periods. Crop rotation is an effective erosion-control practice in gently sloping areas and in the steeper areas. The amount of time that hay or pasture should remain in the rotation increases as the slope increases. Erosion can be minimized during the establishment of forage plantings by planting companion crops or by using no-till seeding methods. In areas where slopes are relatively long and uniform, contour farming is an effective erosion-control method on gently sloping soils and contour stripcropping is an effective method on the steeper soils. In many areas, slopes are so short and irregular that contour stripcropping is not practical. In such areas, conservation tillage, which leaves crop residue on the surface, or a cropping system that provides substantial vegetative cover is needed to control erosion.

Diversions help to control erosion by intercepting runoff and diverting it across the slope. They are best suited to deep, well drained and moderately well drained, gently sloping and sloping soils that have relatively long and uniform slopes. They are well suited to soils that are in areas below the steeper slopes, such as Glenford soils.

Conservation tillage practices that leave crop residue on the surface, including no-till farming, can be adapted to most of the soils in the survey area. These practices are best suited to well drained and moderately well drained soils that dry and warm up early in spring. Adequate drainage is important if conservation tillage systems are used on very poorly drained to somewhat poorly drained soils. Conservation tillage requires a high level of management, including weed and insect control *(31)*.

Contour farming, contour stripcropping, and grassed waterways can be used along with conservation tillage methods to reduce the hazard of erosion in some areas. Nearly level, very poorly drained and somewhat poorly drained soils in areas where the hazard of erosion is slight are well suited to conventional fall plowing. If gently sloping to moderately steep soils are plowed during the fall, however, excessive erosion can result during the winter and spring.

Slippage is a major management concern on some soils, regardless of the planned land use. In areas used for crops or pasture, slips make operating machinery difficult or hazardous. In areas where soils have slipped, the surface is broken or undulating, which makes mowing, planting, or harvesting difficult. Soils in the survey area that are susceptible to slippage include Brookside, Claysville, Guernsey, Lowell, and Upshur soils. The high content of clay in these soils causes them to swell when wet, which creates tremendous lateral pressure. This pressure, combined with gravitational pull, causes the soil to slip downslope in sheets or blocky masses *(11, 14)*.

After slippage occurs, it is difficult to repair and stabilize the soil. Excess water swells and lubricates the soil, and removing excess water can help to stabilize the soil. Surface and subsurface drains can be installed above the slip to reduce ponding and to intercept the lateral movement of water. This procedure is very difficult, however, and has proven to be only moderately successful *(29)*. After it is drained, the land should be restored to an even grade, which allows positive surface drainage. Disturbing the land as little as possible, leaving tree roots that help to hold the soil in place, minimizing water infiltration, and leaving foot slopes undisturbed are some precautions that can be taken in areas where slips are likely.

Information on soil management practices for erosion control on each kind of soil is available from the local office of the Natural Resources Conservation Service.

Wetness is an important management concern in Muskingum County. A drainage system is the primary management need on about 20 percent of the cropland in the county. It is a secondary need in many other areas. Oxygen is not available in soils that are saturated with water, and most plant roots cannot grow without oxygen. Also, wet soils remain cold in the spring, and planting is delayed. Livestock that graze on wet, soft soils compact the surface layer and damage pasture plants.

Some of the soils in the county, such as the poorly drained and very poorly drained Killbuck, Lorain, Luray, Melvin, and Sebring soils, are naturally so wet that the production of the commonly grown crops is not possible unless a drainage system is installed. Such soils make up about 9,100 acres in the survey area. Undrained areas of these soils are considered to be potential wetland areas that are important as habitat for waterfowl and other wetland wildlife.

Unless artificially drained, the somewhat poorly drained soils are so wet that crops are damaged during most years and planting or harvesting may be delayed. Claysville, Guernsey, Fitchville, Jimtown, McGary, and Newark soils, which make up about 17,000 acres in the survey area, are examples of somewhat poorly drained soils. Areas of these soils include significant areas of potential wetlands.

Small areas of wet soils in seepy areas along drainageways and in swales are commonly included in areas of Clarksburg, Guernsey, Keene, Zanesville, and other moderately well drained soils. Artificial drainage is needed in areas of these wet soils.

The design of surface and subsurface drainage systems varies with the kind of soil. A combination of surface drainage and subsurface drainage is needed in most areas of the poorly drained and very poorly drained soils that are used for intensive row cropping. Drains should be more closely spaced in slowly permeable soils than in the more rapidly permeable soils. Establishing adequate natural outlets for subsurface drainage systems can be difficult in many areas of the Melvin and Sebring soils. A pump drainage system may be needed.

Periodic inspection and maintenance are needed to keep a drainage system working properly. Outlet ditches need regular cleaning to prevent sediment from blocking drain outlets and to keep brush from restricting water flow. Controlling weeds and brush and maintaining grass cover along the ditchbanks keep the ditchbanks stable and reduce streambank erosion. Subsurface drain outlets should be protected from erosion. Using animal guards prevents rodents from entering outlets and blocking drains. Replacing broken drains prevents sediment from accumulating and restricting water flow. Information on the design of drainage systems for each kind of soil is provided in the "Technical Guide," which is available in local offices of the Natural Resources Conservation Service.

Droughtiness is a major concern on some soils in Muskingum County. Some of the most droughty soils, including Berks and Rodman soils, are primarily used as woodland. Shortages of available water commonly occur in some areas used as cropland, hay, or pasture. Lakin and Watertown soils are the most droughty soils in the county. Droughtiness is less common in areas of Chili, Stonelick, and Tioga soils and in areas of soils that have a restricted root zone, such as Homewood and Gilpin soils.

Many of the soils in which moisture shortages occur are well suited to conservation tillage or no-till farming methods. The crop residue left on the surface by these methods conserves soil moisture by increasing the rate of water infiltration and by reducing the runoff and evaporation rates.

Soil fertility is an important management concern on all soils used as cropland or pasture. About 16 chemical elements are essential to the growth of plants *(26)*. Adequate levels of plant nutrients, lime, and organic matter are needed for sustained high crop yields and productive pastures. The fertility of a soil depends on its natural fertility and its past use and management, including applications of lime and fertilizer. For this reason, soil fertility can vary widely from field to field, even on the same kind of soil.

The ability of a soil to store and release plant nutrients is affected by factors such as texture, reaction, the content of organic matter, and the type of clay minerals that are present. Many nutrients are most available to plants when the reaction of the soil is nearly neutral. These nutrients become less available as the soil becomes more acid or more alkaline. Most of the soils in Muskingum County are typically medium acid or strongly acid in the root zone and need periodic applications of lime to increase the availability of plant nutrients. The texture of the soil, the content of organic matter, and the type of clay minerals in the soil affect the cation-exchange capacity of the soil. The cation-exchange capacity affects the ability of a soil to store and release plant nutrients. In general, the capacity to store and release plant nutrients increases as the content of clay and organic matter increases.

Claysville and Lorain soils, which have a high content of clay and organic matter, have a high capacity to store and release plant nutrients. Chili and Rigley soils, which have a low content of clay and organic matter, have a lower capacity to store and release nutrients and are subject to higher nutrient losses caused by leaching. On soils that are subject to leaching, frequent, light applications of lime and fertilizer are preferable to less frequent, heavy applications. Applying lime and fertilizer more frequently minimizes the loss of nutrients.

On all soils, additions of lime and fertilizer should be based on the results of soil tests, on the needs of the crop, and on the expected level of yields. The Cooperative Extension Service can help in determining the kinds and amounts of fertilizer and lime to apply.

Organic matter is an important part of the soil. It influences many soil properties, including color, structure, tilth, the rate of water infiltration, available water capacity, and cation-exchange capacity. The content of organic matter in the surface layer of the light-colored mineral soils in Muskingum County generally ranges from moderate in uneroded soils to low in eroded soils. The content of organic matter is generally high in the surface layer of the dark mineral soils in the county. Cultivation on sloping soils tends to reduce the content of organic matter through increased oxidation and erosion. Returning crop residue to the soil helps to maintain the content of organic matter. Planting cover crops, sod crops, and green manure crops and adding barnyard manure also help to maintain or increase the content of organic matter.

Sewage sludge can be a source of organic matter and plant nutrients. Using a proper application rate is important if sewage sludge is applied to the soil. Potential management concerns associated with the application of sewage sludge include hazards caused by heavy metals, odor problems, and other health hazards. The chemical composition of the sludge should be determined prior to application. Applications of sludge to cropland should be based on the sludge analysis, soil tests, plant tissue tests, and the expected level of yields. The Cooperative Extension Service can provide information on application of sewage sludge.

Tillage management involves the selection of the method and time for tillage and is an important factor in the germination of seeds and the rate of water infiltration. Soils that have good tilth are granular and porous. Maintaining tilth is a management concern on many of the soils in Muskingum County.

Most of the soils used for crops in the survey area have a light-colored surface layer of silt loam that has a moderate to low content of organic matter. Generally, the structure of such cultivated soils is relatively weak, and heavy rainfall causes the unvegetated surface to form a crust. The crust is hard when it is dry, and it reduces the rate of water infiltration and the movement of air. A crust also retards the emergence of seedlings and increases the runoff rate. Regular additions of crop residue, manure, and other organic material can improve soil structure and minimize the formation of crusts. Using a system of conservation tillage, such as no-till farming, that leaves crop residue on the surface also can improve tilth. Conservation tillage methods can minimize crusting because the crop residue protects the surface from the force of falling raindrops.

If no-till farming methods are used, organic matter is not incorporated into the soil but instead accumulates on the surface. The organic matter binds the small silt and clay particles into larger aggregates, which are more difficult to dislodge when struck by raindrops than the individual particles. Also, the larger spaces between the aggregates permit a more rapid rate of water infiltration, which helps to control runoff.

Fall plowing is generally not a good practice on light-colored soils that have a surface layer of silt loam because of crusting during winter and spring. If plowed, many of the soils are nearly as dense and hard at planting time as they were before they were plowed. Also, about one-half of the cropland in the survey area consists of sloping soils that are subject to erosion if they are plowed in the fall.

The very poorly drained Lorain soils have a high content of clay, and tilth is a problem because the soils often remain wet until late in spring. If plowed when too wet, these soils tend to become very compacted and cloddy when dry. The cloddiness makes preparing a good seedbed difficult. Plowing these soils in the fall generally results in good tilth in the spring because freezing and thawing during winter help to break up the clods.

Flooding is a major management concern on about 7 percent of the land in Muskingum County. Flooding occurs occasionally on about 23,600 acres and frequently on about 5,200 acres. Normally, flooding during the growing season severely reduces yields of grain crops. Flooding during the dormant season limits the use of the soils for some grain crops, such as winter wheat. The quality and longevity of forage plants are affected by longer periods of flooding. An additional 4,500 acres is on flood plains that are subject to only rare flooding. The development of upstream dams, such as the Dillon Lake dam and the Wills Creek Reservoir dam, has reduced the hazard of flooding in these areas.

The stability of streambanks is another management concern associated with flooding. Some soils on flood plains, such as Tioga fine sandy loam, are very unstable and move freely when saturated. Streambank erosion along meandering channels can occur during periods of high water, when the flow is increased and the soil is saturated. Revegetating the banks with shrubs that have a fibrous root system and shaping the land help to stabilize the banks and minimize erosion. Management is more intensive and also more costly if the area to be stabilized is on the outside radius of a meander. Commonly, stone riprap or other protective measures are required in addition to revegetation.

Pasture

More than one-fourth of the land area in the county is used for pasture. Pasture and hay plants commonly grown include alfalfa, red clover, alsike clover, bluegrass, orchardgrass, tall fescue, timothy, and bromegrass. In most areas, pastures can be improved by using the methods described in the following paragraphs.

The ability of a pasture to produce forage and an adequate plant cover for erosion control is affected by the number of livestock, the grazing period, the grazing season, and the availability of water. Using proper stocking rates, rotating pastures, deferring grazing, grazing during the proper season, mowing or using herbicides for weed control, applying lime and fertilizer, and controlling insects help to maintain key forage species.

Intensive grazing is a method of pasture management that is used in Muskingum County. This method consists of a cycle of controlled grazing, in which forage plants are grazed to a predetermined height by a large number of livestock in a small, confined area. Electric fences are used to form small paddocks, and they are frequently moved to permit the grazing of the next forage area. The closely grazed area is allowed to recover during a rest period before the animals are returned. This system requires a much higher level of management than other methods, beginning with the planning phase. Water management, erosion control, and frequent soil tests are needed.

Erosion is a management concern on sloping to steep soils used for pasture. The hazard of erosion increases as the slope gradient increases, and many of the soils are already eroded. Erosion also is a hazard in areas that have been overgrazed. Control of erosion is particularly important when plants are being seeded. No-till seeding, mulching, or planting a companion crop of small grain helps to prevent further erosion.

The need for applications of lime and fertilizer should be determined by soil tests, and adequate amounts should be supplied to meet the requirements of the grasses or legumes to be grown.

Soil compaction is caused by grazing when the soils are wet. It can greatly reduce the vigor of pasture plants. On sloping soils, it can also increase the hazard of erosion and the rate of runoff. Timely deferment of grazing during wet periods minimizes soil compaction. Subsurface drains can remove excess water from pastures. Installing a drainage system is expensive, however, and it is rarely practical unless the pastures are very intensely managed.

Seeding mixtures should be based on the soil type and the pasture management system to be used. Legumes increase the nutrient value of the forage and provide nitrogen for grasses. Alfalfa should be seeded on soils that have good drainage and adequate levels of plant nutrients and lime. Alsike clover is better adapted than red clover to the wetter soils. Information about seeding mixtures, herbicides, and management practices for specific soils can be obtained from local offices of the Cooperative Extension Service and the Natural Resources Conservation Service.

Specialty Crops

Specialty crops that are grown commercially in Muskingum County include vegetables, nursery stock, Christmas trees, and fruits. Throughout the county, a small acreage is used for melons, strawberries, raspberries, sweet corn, tomatoes, vegetables, or small fruits. Potatoes and melons are grown commercially in extensive areas along the Muskingum River. Apples and peaches are the most important tree fruits grown in the county. Large areas can be adapted to specialty crops, such as tomatoes and vegetables. Most of the well drained soils are suitable for orchards and nursery plants. Orchards that are established on sites in the higher landscape positions have good cold air drainage, which is effective in reducing the hazard of frost damage. Soils in the lower landscape positions, where frost is common, generally are less well suited to early vegetables, small fruits, and orchards. The latest information about growing specialty crops can be obtained from local offices of the Cooperative Extension Service and the Natural Resources Conservation Service.

Management of Disturbed Lands

In 1987, about 39,261 acres in Muskingum County had been affected by surface mining. About 46 percent of this land was mined prior to the enactment of the 1972 Ohio Reclamation Law and has not been reclaimed. The unreclaimed land consists mostly of graded and ungraded ridges and piles of spoil. Soils in these unreclaimed areas include Bethesda, Fairpoint, and Morristown soils.

Legislation enacted in 1972 requires the reclamation of all land that is mined after that time. Reclamation consists of restoring the land to the approximate original contour and blanketing the surface with natural topsoil and subsoil material. Reclaimed soils make up about 21,330 acres in Muskingum County. Fairpoint silty clay loam, 15 to 25 percent slopes, and Morristown silty clay loam, 1 to 8 percent slopes, are examples. Reclaimed soils have a greater potential for agricultural production than unreclaimed mine soils, but they have limitations that should be considered in management.

The current law requires that natural soils identified as prime farmland be restored in natural sequence to a depth of as much as 48 inches following mining. Most soils in surface-mined areas do not meet the requirements for prime farmland. As a result, most of the mined land in the county has been reclaimed by spreading only 6 inches of soil material over the spoil. Soil properties must be considered in managing these soils. The content of organic matter is considerably lower in mined soils than in natural soils *(30)*.

A high bulk density is common in both the replacement soil material and in the underlying graded spoil. This compaction is caused by heavy machinery, especially wheeled vehicles used in reclamation; by excessive handling of topsoil material during stockpiling and spreading; and by performing mining and reclamation activities under unfavorable moisture conditions. There has been an insufficient amount of time for soil-forming processes to loosen the soil on these reclaimed sites. The high bulk density restricts root development, resulting in decreased crop yields.

Mine spoil typically has 35 to 60 percent rock fragments. In contrast, most unmined soils have 0 to 15 percent coarse fragments in the surface layer. Soil material used to blanket the spoil during reclamation commonly has less than 20 percent rock fragments. Coarse fragments reduce the effective root zone and the available water capacity in mine soils. Roots tend to be concentrated along the contact between the soil and the coarse fragments, and few roots can penetrate the compact, massive spoil material.

Seeding forage plants is the best means of restoring the productivity of mine spoil. Adapted forage plants can be used to increase the content of organic matter, improve soil structure, reduce compaction, and increase the rate of water infiltration and the pore space in the mine spoil. Forage crops are better soil-building crops than row crops and are more effective in minimizing runoff and erosion. Reseeding may be needed if stands are thin. Seeding companion crops, using no-till seeding methods, or adding mulch can help to control erosion. Mine soils are generally unsuited to winter grazing when they are wet. Grazing in winter can compact the surface layer, damage plants, and increase the hazard of erosion. These soils are better suited to frequent, light applications of fertilizer than to heavier applications because plant nutrients are lost through runoff and because the roots are concentrated in the upper few inches of the soil.

Yields per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 6. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. The land capability classification also is shown in the table.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 6 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Natural Resources Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for woodland or for engineering purposes.

In the capability system, soils are generally grouped at three levels—capability class, subclass, and unit *(33)*. Only class and subclass are used in this survey.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, IIe. The letter *e* shows that the main hazard is the risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c,* used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclasses indicated by *w, s,* or *c* because the soils in class V are subject to little or no erosion. They have other limitations that restrict their use to pasture, woodland, wildlife habitat, or recreation.

The acreage of soils in each capability class and subclass is shown in table 7. The capability classification of the map units in this survey area is given in the section "Detailed Soil Map Units" and in the yields table.

Woodland Management and Productivity

Woodland makes up approximately 152,800 acres, or about 37 percent of the total land area in Muskingum County *(23)*. Most of this woodland is privately owned, but about 6,000 acres is State or Federal land. Extensive clearing of woodland areas prior to mining has occurred in Adams, Madison, Meigs, Monroe, and Rich Hill Townships. These townships are the main coal-producing areas in Muskingum County. Most areas in these townships are reclaimed land and have been seeded with grasses rather than replanted with trees. Some abandoned pastures are reverting to woodland.

The woodland in Muskingum County includes several forest types. Mixed oak forest is most common on upland hillsides and ridges. White oak is more dominant on the broader ridgetops. In the southern part of the county, droughty sites on southern aspects are dominated by chestnut oak and north-facing, very steep hillsides support isolated stands of hemlock. Mixed mesophytic forests are most commonly on moderately well drained soils on the lower parts of hillsides. Beech-maple forests are in glaciated areas along the western edge of the county. Swamp forests are on the more poorly drained soils in valleys and on flood plains. Bottom-land hardwood forests, which include maples, sycamore, and black walnut, are in the better drained areas on flood plains.

Woodland management, including improvement of existing timber stands and reservation of areas for woodland expansion, is sporadic in the county. Many woodland areas show evidence of abuse and neglect. Woodland grazing combined with excessive harvesting of high-grade trees has resulted in stands that are understocked or that contain trees of little value. Culls and trees of low value now occupy many of the best woodland soils. Development of woodland areas could provide a source of future income for the county.

Woodland productivity of the soils varies. The available water capacity of a soil is an important factor that affects tree growth. It is influenced by soil depth, texture, permeability, and internal drainage. Other properties that affect woodland productivity are the slope, the degree of past erosion, acidity, and the natural fertility of the soil. Very steep slopes limit the types of equipment and management practices that can be used. Also, runoff and erosion increase as the slope gradient increases. Erosion reduces the amount of soil available for water storage. Severe erosion removes the porous surface layer and exposes the less porous subsoil. This process increases runoff and reduces the rate of water infiltration and thus severely inhibits tree growth and natural reseeding.

The aspect and landscape position of the soil also are important factors that affect tree growth *(8)*. Aspect refers to the compass direction in which the slope faces. Trees grow better on north aspects and in coves than on other sites because they are less exposed to the prevailing winds and the sun. They grow more slowly on south aspects because of higher soil temperatures and a higher evaporation rate resulting from more direct exposure to the wind and sun. The landscape position of a soil determines the availability of moisture for tree growth. Soil moisture tends to increase downslope because of the lateral downhill movement of water. Generally, the soils are deeper, the rate of evaporation of soil moisture is lower, and the soil temperature is lower on the lower parts of slopes.

Management and productivity of a plantation or forest also are affected by factors that are not directly related to the soil. Tree species that can withstand environmental conditions in a particular area should be selected, and the proper planting procedures for tree seedlings should be followed. Protecting the plantations from grazing by livestock helps to prevent damage to the stands and the entry of disease and harmful insects into tree butts and exposed roots. Trees and shrubs in woodlands that are grazed commonly are replaced by less desirable species, such as multiflora rose, hawthorn, and crabapple.

Improving timber stands is a good practice if the woodland is managed for timber. Removing the less desirable trees, vines, and shrubs allows the more desirable trees, such as oaks, walnut, and yellow-poplar, to achieve an optimum growth rate. Thinning promotes vigorous growth and reduces plant competition.

Fire prevention is an important part of good woodland management. Debris and downed timber should be removed as soon as possible. Firebreaks should be established, especially on large tracts of timber. Mowing grassed areas along roads and deferring or controlling the burning of trash during periods of extreme drought also are good practices.

Table 8 can be used by woodland owners or forest managers in planning the use of soils for wood crops. Only those soils suitable for wood crops are listed. The table lists the ordination symbol for each soil. Soils assigned the same ordination symbol require the same general management and have about the same potential productivity.

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for an indicator tree species. The number indicates the volume, in cubic meters per hectare per year, which the indicator species can produce. The number 1 indicates low potential productivity; 2 and 3, moderate; 4 and 5, moderately high; 6 to 8, high; 9 to 11, very high; and 12 to 39, extremely high. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *R* indicates steep slopes; *X*, stoniness or rockiness; *W*, excess water in or on the soil; *T*, toxic substances in the soil; *D*, restricted rooting depth; *C*, clay in the upper part of the soil; *S*, sandy texture; *F*, a high content of rock fragments in the soil; and *N*, snowpack. The letter *A* indicates that limitations or restrictions are insignificant. If a soil has more than one limitation, the priority is as follows: R, X, W, T, D, C, S, F, and N.

In table 8, *slight, moderate,* and *severe* indicate the degree of the major soil limitations to be considered in management.

Erosion hazard is the probability that damage will occur as a result of site preparation and cutting where the soil is exposed along roads, skid trails, and fire lanes and in log-handling areas. Forests that have been burned or overgrazed are also subject to erosion. Ratings of the erosion hazard are based on the percent of the slope. A rating of *slight* indicates that no particular prevention measures are needed under ordinary conditions. A rating of *moderate* indicates that erosion-control measures are needed in certain silvicultural activities. A rating of *severe* indicates that special precautions are needed to control erosion in most silvicultural activities.

Seedling mortality refers to the death of naturally occurring or planted tree seedlings, as influenced by the kinds of soil, soil wetness, or topographic conditions. The factors used in rating the soils for seedling mortality are texture of the surface layer, depth to a seasonal high water table and the length of the period when the water table is high, rock fragments in the surface layer, effective rooting depth, and slope aspect. A rating of *slight* indicates that seedling mortality is not likely to be a problem under normal conditions. Expected mortality is less than 25 percent. A rating of *moderate* indicates that some problems from seedling mortality can be expected. Extra precautions are advisable. Expected mortality is 25 to 50 percent. A rating of *severe* indicates that seedling mortality is a serious problem. Extra precautions are important. Replanting may be necessary. Expected mortality is more than 50 percent.

Windthrow hazard is the likelihood that trees will be uprooted by the wind because the soil is not deep enough for adequate root anchorage. The main restrictions that affect rooting are a seasonal high water table and the depth to bedrock, a fragipan, or other limiting layers. A rating of *slight* indicates that under normal conditions no trees are blown down by the wind. Strong winds may damage trees, but they do not uproot them. A rating of *moderate* indicates that some trees can be blown down during periods when the soil is wet and winds are moderate or strong. A rating of *severe* indicates that many trees can be blown down during these periods.

Plant competition ratings indicate the degree to which undesirable species are expected to invade and grow when openings are made in the tree canopy. The main factors that affect plant competition are depth to the water table and the available water capacity. A rating of *slight* indicates that competition from undesirable plants is not likely to prevent natural regeneration or suppress the more desirable species. Planted seedlings can become established without undue competition. A rating of *moderate* indicates that competition may delay the establishment of desirable species. Competition may hamper stand development, but it will not prevent the eventual development of fully stocked stands. A rating of *severe* indicates that competition can be expected to prevent regeneration unless precautionary measures are applied.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a *site index* and as a *volume* number. The site index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Commonly grown trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

The *volume*, a number, is the yield likely to be produced by the most important trees. This number, expressed as cubic feet per acre per year, indicates the amount of fiber produced in a fully stocked, even-aged, unmanaged stand.

The first species listed under *common trees* for a soil is the indicator species for that soil. It generally is the most common species on the soil and is the one that determines the ordination class.

Trees to plant are those that are suitable for commercial wood production.

Woodland Harvesting and Regeneration Activities

Table 9 gives information about the operation of equipment used for harvesting and regeneration in woodland areas. Limitations affecting the use of equipment are shown for haul roads, log landings, skid trails and logging areas, and site preparation and planting. The limitations are considered *slight* if the physical characteristics of the site impose few or no restrictions on the kind of equipment that can be used or on the time of operation, and they are considered *moderate* if the characteristics impose some restrictions. Limitations are considered *severe* if the physical conditions of the site require special equipment or techniques or if the time of efficient operation is very limited. The ratings are based on soil properties, site features, and observed performance of the soils.

Most *haul roads* are access roads that lead from log landings to primary or surfaced roads. Generally, these roads are unpaved and are not graveled. Some haul roads are constructed for access to gas or oil well sites, and the ratings given apply to these roads as well. Wetness, rockiness, depth to hard bedrock, stoniness, soil strength, slope, soil texture, and flooding are soil properties and hazards that should be considered in selecting routes for haul roads. Wetness and flooding affect the use of equipment. Rock outcrops, stones, and boulders are difficult to remove and hinder construction if cutting and filling are needed. Soil strength is a measure of the traffic-supporting capacity of the soil. Slope is a concern if cutting and filling are required.

Log landings are areas where logs are assembled for transportation. Commonly, these areas require little or no surface preparation or filling. Sites chosen for development of oil and gas wells have similar properties. Considerable soil compaction can be expected in these areas. Wetness, flooding, rockiness, stoniness, slope, depth to hard bedrock, soil strength, soil texture, and coarse fragments are soil properties and hazards that should be considered in selecting sites for log landings. Wetness and flooding affect the use of equipment. Rock outcrops, stones, and boulders affect the configuration and location of landings. The slope and the depth to hard bedrock are concerns if cutting and filling are required. The texture of the soil affects trafficability.

Skid trails and logging areas include areas where some or all of the trees are being cut. Skid trails are roads over which logs are dragged or hauled with rubber-tired equipment from the stump to a log landing. Wetness, flooding, rockiness, stoniness, soil texture, and slope affect the use of equipment during logging activities in these areas. Other types of equipment can sometimes be used to minimize or overcome site limitations. Special equipment is usually required during periods when the surface layer is saturated, but the use of equipment during such periods should be avoided. Avoiding the use of sites that are susceptible to flooding for long periods helps to prevent damage to equipment and the environment. Surface stones and boulders and rock outcrops hinder the efficient and safe use of equipment. Traction problems increase as the slope increases. Clayey and sandy soils have special traction problems. Traction is reduced on clayey soils when they are wet and on sandy soils when they are dry. Using rubber-tired or tracked equipment on organic soils results in severe environmental damage, unless the soils are frozen.

Site preparation and planting include mechanized site preparation, planting, and row seeding. Wetness, flooding, rockiness, stoniness, coarse fragments, depth to hard bedrock, soil texture, and slope affect the use of equipment during site preparation and planting. Special equipment is usually required during wet periods, but operating equipment should be avoided in areas that are flooded for long periods or during periods when the surface layer is saturated. Surface stones, boulders, and rock outcrops hinder the efficient and safe operation of equipment. Coarse fragments and hard bedrock that is very close to the surface can interfere with the use of equipment. Traction problems increase as the slope increases. Clayey and sandy soils have special traction problems. Traction is reduced on clayey soils when they are wet and on sandy soils when they are dry.

Christmas Tree Production

Christmas trees are an important specialty crop in Muskingum County. Christmas tree production is increasing in the county, and there is good potential for expansion of the industry. Because of its proximity to highly populated areas, the county is in a favorable location for marketing Christmas trees.

In the past, Christmas tree plantations were commonly located on marginal sites that were too steep, infertile, or severely eroded for other types of agricultural production. Emphasis has now shifted toward the production of high-quality trees, which requires more intensive cultural practices and higher soil productivity. Areas of nearly level to strongly sloping soils are the most desirable for Christmas tree production. All phases of production, from site preparation to harvesting, are easier and less expensive in these areas than in areas on the steeper slopes. The steeper slopes are more vulnerable to erosion and generally are drier and less fertile. Also, areas that are relatively free of large rocks, brush, and other obstacles are preferred for Christmas tree production.

The soils in the survey area vary in their suitability for producing each of several species of Christmas trees that are commonly grown. For example, a soil that is well suited to Scotch pine may be unsuited to the less tolerant Fraser fir. Determining the suitability of the soil for the species to be planted is very important because it can take several years for a soil-related problem to become evident.

In table 10, the soils in Muskingum County are rated for their suitability for nine of the commonly grown Christmas tree species. A rating of *S* indicates that the soil is generally suited to the species. A rating of *L* indicates that the soil has limited suitability for the species. A rating of *N* indicates that the soil is generally unsuited to the species. Numbers following each rating of *L* or *N* indicate reasons for the rating. The numbered reasons are described in the following paragraphs.

The number *1* indicates that damage caused by frost is possible. Soils in depressional areas and narrow valleys, which are susceptible to frost in late spring, are poorly suited to spruce and fir trees.

The number *2* indicates that drought is a hazard. Some species, particularly spruce and fir trees, cannot withstand prolonged shortages of available moisture. Soils that have a limited available moisture capacity, such as Berks soils, have limited suitability for these species.

The number *3* indicates that wetness is a limitation. For example, Fitchville soils have only limited suitability for Scotch pine because of seasonal wetness. Maximum tree growth occurs early in the growing season. In most of the somewhat poorly drained and poorly drained soils, the root zone is saturated during this time of the year.

Soils that are somewhat poorly drained, poorly drained, or very poorly drained have only limited suitability for Christmas trees. The roots of species that need considerable oxygen, such as Colorado blue spruce, do not grow well under saturated conditions. Even the root systems of more tolerant species, such as white pine, are restricted by a high water table. Many of the wetter soils are otherwise well suited to trees, however, and many growers believe that the cost of artificial drainage is justified.

The number *4* indicates that damage caused by frost heave is a limitation. Damage to young Christmas trees caused by frost heave can be severe, especially for shallow-rooted species, such as white pine. Soils that have a high content of silt hold a large amount of water. When the water freezes, it can force tree seedlings upward.

Frost heave is commonly most severe in silty soils that have a fragipan or some other restrictive layer that holds water near the surface. Zanesville and Keene soils are examples of soils that have a silty surface layer and a restrictive underlying layer. The damage caused by frost heave can be minimized by adding mulch or by maintaining ground cover around the seedlings.

The number *5* indicates that growth is limited by moisture shortages and that more time is required to produce a marketable tree. This limitation is considerably less severe than droughtiness.

The number *6* indicates that the delineation of the soil is likely to include seep spots that are too wet for a given species. It may be desirable to plant a different species if the seep spots are more than one-half acre in size. Hand planting may be necessary.

The number *7* indicates that soil cracking is a hazard. Soils that have a high content of clay, such as Upshur and Aaron soils, are susceptible to soil cracking. If a mechanical tree planter is pulled through such soils under wet conditions, the sides of the slot tend to smear or seal. Later in the season, when the soil dries, a crack opens along the slot. The crack allows the roots of young seedlings to dry out. Also, an open crack around the base of a seedling permits the wind to bend the seedling. This can cause a bend in the trunk, which results in the loss of a foot or more of height at maturity.

Windbreaks and Environmental Plantings

Windbreaks protect livestock, buildings, and yards from wind and snow. They also protect fruit trees and gardens, and they furnish habitat for wildlife. Several rows of low- and high-growing broadleaf and coniferous trees and shrubs provide the most protection.

Field windbreaks are narrow plantings made at right angles to the prevailing wind and at specific intervals across the field. The interval depends on the erodibility of the soil. Field windbreaks protect cropland and crops from wind, help to keep snow on the fields, and provide food and cover for wildlife.

Environmental plantings help to beautify and screen houses and other buildings and to abate noise. The plants, mostly evergreen shrubs and trees, are closely spaced. To ensure plant survival, a healthy planting stock of suitable species should be planted properly on a well prepared site and maintained in good condition.

Table 11 shows the height that locally grown trees and shrubs are expected to reach in 20 years on various soils. The estimates in table 11 are based on measurements and observation of established plantings that have been given adequate care. They can be used as a guide in planning windbreaks and screens. Additional information on planning windbreaks and screens and planting and caring for trees and shrubs can be obtained from local offices of the Natural Resources Conservation Service or the Cooperative Extension Service or from a commercial nursery.

Recreation

The potential for developing recreational areas in Muskingum County is good. Many open areas and areas of woodland could be developed for parks, nature preserves, or other recreational facilities.

The soils of the survey area are rated in table 12 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreational uses by the duration and intensity of flooding and the season when flooding occurs. In planning recreational facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 12, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 12 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 15 and interpretations for dwellings without basements and for local roads and streets in table 14.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

Paths and trails for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

Wildlife Habitat

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 13, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flooding. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, oats, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flooding, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, timothy, bromegrass, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flooding. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are foxtail, goldenrod, smartweed, ragweed, and fall panicum.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness. Examples of these plants are oak, beech, cherry, sweetgum, apple, hawthorn, dogwood, hickory, blackberry, and black raspberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are shrub honeysuckle, autumn-olive, and crabapple.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, spruce, cedar, and juniper.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are swamp smartweed, wild millet, cattails, willow, yellow nutsedge, rushes, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. Wildlife attracted to these areas include bobwhite quail, pheasant, meadowlark, field sparrow, cottontail, and red fox.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, ruffed grouse, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, and deer.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, herons, muskrat, mink, and beaver.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. Ratings are given for building site development, sanitary facilities, construction materials, and water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kinds of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Table 14 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, a cemented pan, or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and depth to the water table.

Dwellings and *small commercial buildings* are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrinking and swelling, and organic layers can cause the movement of footings. A high water table, depth to bedrock or to a cemented pan, large stones, slope, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 or 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or stabilized soil material; and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock or to a cemented pan, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost action potential, and depth to a high water table affect the traffic-supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to bedrock or to a cemented pan, the available water capacity in the upper 40 inches, and toxic substances affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

Table 15 shows the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 15 also shows the suitability of the soils for use as daily cover for landfill. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock or to a cemented pan, and flooding affect absorption of the effluent. Large stones and bedrock or a cemented pan interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 15 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock or to a cemented pan, flooding, large stones, and content of organic matter.

Excessive seepage resulting from rapid permeability in the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground-water pollution. Ease of excavation and revegetation should be considered.

The ratings in table 15 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, and soil reaction affect trench landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as the final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 16 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a *probable* or *improbable* source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help to determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, a low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have a moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet and have a water table at a depth of less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and *gravel* are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. In table 16, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable, loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are naturally fertile or respond well to fertilizer and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel or stones, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel or stones, have slopes of more than 15 percent, or have a seasonal high water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

Table 17 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed excavated ponds. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders or organic matter. A high water table affects the amount of usable material. It also affects trafficability.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, permeability of the aquifer, and quality of the water as inferred from the salinity of the soil. Depth to bedrock and the content of large stones affect the ease of excavation.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a cemented pan, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and the potential for frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or to a cemented pan, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as sulfur. Availability of drainage outlets is not considered in the ratings.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to control erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of soil blowing or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or to a cemented pan affect the construction of grassed waterways. A hazard of soil blowing, low available water capacity, restricted rooting depth, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics. These results are reported in table 21.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help to characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classification, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

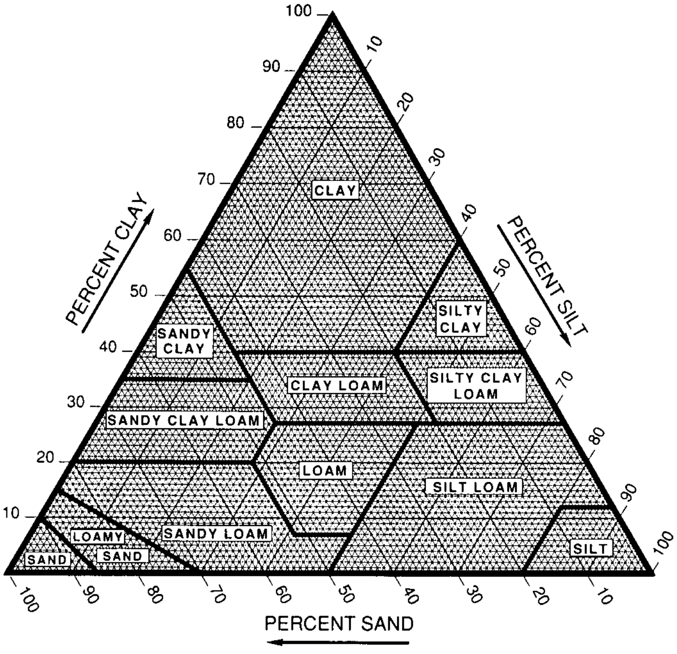

Figure 15.—Percentages of clay, silt, and sand in the basic USDA soil textural classes.

Engineering Index Properties

Table 18 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under the heading "Soil Series and Their Morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter (fig. 15). "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as about 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system *(2)* and the system adopted by the American Association of State Highway and Transportation Officials *(1)*.

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Rock fragments larger than 3 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical and Chemical Properties

Table 19 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at ⅓-bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems and septic tank absorption fields.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, greater than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.05 to 0.69. The higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their resistance to soil blowing in cultivated areas. The groups indicate the susceptibility to soil blowing. Soils are grouped according to the following distinctions:

1. Coarse sands, sands, fine sands, and very fine sands. These soils are generally not suitable for crops. They are extremely erodible, and vegetation is difficult to establish.

2. Loamy coarse sands, loamy sands, loamy fine sands, loamy very fine sands, and sapric soil material. These soils are very highly erodible. Crops can be grown if intensive measures to control soil blowing are used.

3. Coarse sandy loams, sandy loams, fine sandy loams, and very fine sandy loams. These soils are highly erodible. Crops can be grown if intensive measures to control soil blowing are used.

4L. Calcareous loams, silt loams, clay loams, and silty clay loams. These soils are erodible. Crops can be grown if intensive measures to control soil blowing are used.

4. Clays, silty clays, noncalcareous clay loams, and silty clay loams that are more than 35 percent clay. These soils are moderately erodible. Crops can be grown if measures to control soil blowing are used.

5. Noncalcareous loams and silt loams that are less than 20 percent clay and sandy clay loams, sandy clays, and hemic soil material. These soils are slightly erodible. Crops can be grown if measures to control soil blowing are used.

6. Noncalcareous loams and silt loams that are more than 20 percent clay and noncalcareous clay loams that are less than 35 percent clay. These soils are very slightly erodible. Crops can be grown if ordinary measures to control soil blowing are used.

7. Silts, noncalcareous silty clay loams that are less than 35 percent clay, and fibric soil material. These soils are very slightly erodible. Crops can be grown if ordinary measures to control soil blowing are used.

8. Soils that are not subject to soil blowing because of coarse fragments on the surface or because of surface wetness.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 19, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

Table 20 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are assigned to one of four groups. They are grouped according to the infiltration of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to two hydrologic groups in table 20, the first letter is for drained areas and the second is for undrained areas.

Flooding, the temporary inundation of an area, is caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, nor is water in swamps and marshes.

Table 20 gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions (the chance of flooding is nearly 0 percent to 5 percent in any year); *occasional* that it occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year); and *frequent* that it occurs often under normal weather conditions (the chance of flooding is more than 50 percent in any year). Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, *long* if 7 days to 1 month, and *very long* if more than 1 month. Probable dates are expressed in months. About two-thirds to three-fourths of all flooding occurs during the stated period.

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 20 are depth to the seasonal high water table; the kind of water table—that is, perched or apparent; and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated in table 20.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Only saturated zones within a depth of about 6 feet are indicated. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. The first numeral in the range indicates how high the water rises above the surface. The second numeral indicates the depth below the surface.

Depth to bedrock is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

Potential frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured, clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage mainly to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low, moderate,* or *high,* is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low, moderate,* or *high.* It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Physical and Chemical Analyses of Selected Soils

Samples of many of the soils in Muskingum County were analyzed by the Soil Characterization Laboratory, Department of Agronomy, Ohio State University, Columbus, Ohio. The physical and chemical data obtained from the samples include particle-size distribution, reaction, organic matter content, calcium carbonate equivalent, and extractable cations. These data were used in classifying and correlating the soils and in evaluating their behavior under various land uses.

Eleven of the sampled pedons were selected as representative of their respective series. These pedons are described in the section "Soil Series and their Morphology." The series and their laboratory identification numbers are Alford (MS-20), Claysville (MS-32), Coshocton (MS-29), Keene (MS-25), Lowell (MS-24), Morristown (MS-23), Upshur (MS-31), Watertown (MS-30), Westgate (MS-28), Westmoreland (MS-22), and Zanesville (MS-10).

In addition to the data from Muskingum County, laboratory data are available from nearby counties that have many of the same soils. These data and the data from Muskingum County are on file at the Department of Agronomy, Ohio State University, Columbus, Ohio; the Ohio Department of Natural Resources, Division of Soil and Water Conservation, Columbus, Ohio; and the Natural Resources Conservation Service, State Office, Columbus, Ohio.

Engineering Index Test Data

Table 21 shows laboratory test data for several pedons sampled at carefully selected sites in the survey area. The pedons are representative of the series described in the section "Soil Series and Their Morphology." The soil samples were tested by the Ohio Department of Transportation, Division of Highways, Testing Laboratory.

The testing methods generally are those of the American Association of State Highway and Transportation Officials (AASHTO) or the American Society for Testing and Materials (ASTM).

The tests and methods are AASHTO classification—M 145 (AASHTO), D 3282 (ASTM); Unified classification—D 2487 (ASTM); Mechanical analysis—T 88 (AASHTO), D 422 (ASTM), D 2217 (ASTM); Liquid limit—T 89 (AASHTO), D 4318 (ASTM); Plasticity index—T 90 (AASHTO), D 4318 (ASTM); and Moisture density—T 99 (AASHTO), D 698 (ASTM).

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories *(35)*. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 22 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Eleven soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Alfisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Aqualf (*Aqu*, meaning water, plus *alf*, from Alfisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Ochraqualfs (*Ochr*, meaning light-colored surface layer, plus *aqualf*, the suborder of the Alfisols that has an aquic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. An example is Aeric Ochraqualfs.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine, mixed, mesic Aeric Ochraqualfs.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the underlying material can differ within a series.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. The soil is compared with similar soils and with nearby soils of other series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the "Soil Survey Manual" *(36)*. Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" *(35)*. Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed Soil Map Units."

Aaron Series

The Aaron series consists of deep, moderately well drained, slowly permeable soils on ridgetops, hillsides, and benches. These soils formed in material weathered from slightly acid to calcareous clay shale and in material weathered from limestone. Slopes range from 2 to 25 percent.

Aaron soils are similar to Guernsey, Lowell, and Keene soils and commonly are adjacent to Coshocton and Upshur soils. Guernsey soils have a higher content of coarse fragments in the subsoil than the Aaron soils. Lowell soils are well drained. Keene and Coshocton soils are in landscape positions similar to those of the Aaron soils. Keene soils have less clay and more silt in the upper part of the solum than the Aaron soils, and Coshocton soils have a higher content of coarse fragments in the upper part of the solum. Upshur soils are redder than the Aaron soils.

Typical pedon of Aaron silt loam, 8 to 15 percent slopes, eroded, about 2 miles south of Sonora, in Perry Township; 1,100 feet south of the intersection of Hicks Road and U.S. Route 40 along Hicks Road, about 550 feet east; T. 1 N., R. 6 W.

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) silt loam, light gray (10YR 7/2) dry; common distinct specks of yellowish brown (10YR 5/4) silty clay loam; weak medium granular structure; friable; many fine roots; slightly acid; abrupt smooth boundary.

Bt1—7 to 16 inches; yellowish brown (10YR 5/4) silty clay loam; weak medium prismatic structure parting to moderate medium subangular blocky; firm; common fine roots; many distinct grayish brown (10YR 5/2) clay films on vertical faces of peds; few coarse fragments of weathered siltstone; medium acid; clear smooth boundary.

Bt2—16 to 26 inches; yellowish brown (10YR 5/4) silty clay; common medium distinct light brownish gray (2.5YR 6/2) and common fine distinct yellowish brown (10YR 5/6) mottles; moderate medium prismatic structure parting to moderate medium subangular blocky; firm; few fine roots; very dark brown (10YR 2/2) oxide stains; many distinct brown (10YR 5/3) clay films on faces of peds; few coarse fragments of weathered siltstone; neutral; clear smooth boundary.

Bt3—26 to 33 inches; light olive brown (2.5YR 5/4) clay; few medium distinct gray (10YR 5/1) and yellowish brown (10YR 5/4) mottles; weak coarse prismatic structure parting to moderate medium subangular blocky; firm; many distinct grayish brown (2.5YR 5/2) clay films on faces of peds; few coarse fragments of weathered siltstone; neutral; clear smooth boundary.

BC—33 to 46 inches; light olive brown (2.5YR 5/4) silty clay loam; few medium distinct olive gray (5YR 5/2) and brownish yellow (10YR 6/6) mottles; weak very coarse prismatic structure; firm; black (10YR 2/1) oxide stains; about 5 percent fragments of weathered siltstone; neutral; gradual smooth boundary.

Cr—46 to 48 inches; grayish brown (2.5YR 5/2), soft clay shale bedrock; massive; olive (5YR 5/6) streaks of lime; slight effervescence.

The thickness of the solum ranges from 30 to 50 inches. The depth to bedrock is 40 to 60 inches. The depth to free calcium carbonate is more than 30 inches. Coarse fragments of siltstone, shale, limestone, and sandstone make up 0 to 10 percent of the Ap and Bt horizons and 0 to 35 percent of the BC and C horizons.

The Ap horizon has value of 4 or 5 and chroma of 2 or 3. Some pedons have an A horizon and an E horizon. The Bt horizon has hue of 10YR or 2.5YR, value of 4 to 6, and chroma of 4 to 8. It is silty clay, clay, or silty clay loam. The BC horizon has hue of 2.5YR or 10YR, value of 4 to 6, and chroma of 3 to 6. It is silty clay loam, silty clay, clay, or the channery or shaly analogs of those textures. Some pedons have a C horizon.

Alford Series

The Alford series consists of deep, well drained, moderately permeable soils on broad ridgetops and at the margin of terraces in valleys that were formerly glacial lakes. These soils formed in silty material deposited by the wind. Slopes range from 2 to 15 percent.

Alford soils are similar to Wellston and Cidermill soils and are commonly adjacent to Cincinnati, Lakin, Westgate, and Zanesville soils. Wellston soils have a higher content of coarse fragments in the lower part of the solum than the Alford soils. Cidermill soils are on glacial outwash terraces. They have loamy and sandy layers in the lower part of the subsoil. Cincinnati and Zanesville soils are in landscape positions similar to those of the Alford soils. They have a fragipan in the lower part of the subsoil. Lakin soils are on dunes. They have more fine sand throughout than the Alford soils. Westgate soils are in landscape positions similar to those of the Alford soils. They have slowly permeable, clayey layers in the lower part of the subsoil.

Typical pedon of Alford silt loam, 2 to 8 percent slopes, 6 miles north of Zanesville, in Muskingum Township; 3,400 feet west and 2,000 feet north of the southeast corner of sec. 21, T. 2 N., R. 8 W.

Ap—0 to 10 inches; brown (10YR 4/3) silt loam, light brownish gray (10YR 6/2) dry; weak fine granular structure; friable; very strongly acid; abrupt smooth boundary.

Bt1—10 to 20 inches; yellowish brown (10YR 5/4) silt loam; moderate fine subangular blocky structure; friable; common faint dark yellowish brown (10YR 4/4) clay films on faces of peds; strongly acid; gradual wavy boundary.

Bt2—20 to 27 inches; yellowish brown (10YR 5/4) silt loam; moderate medium subangular blocky structure; friable; many distinct dark yellowish brown (10YR 4/4) clay films on faces of peds; strongly acid; gradual wavy boundary.

Bt3—27 to 36 inches; yellowish brown (10YR 5/4) silt loam; moderate medium subangular blocky structure; friable; many faint brown (10YR 5/3) silt coatings and dark yellowish brown (10YR 4/4) clay films on faces of peds; common fine prominent dark brown (10YR 3/3) stains; medium acid; clear wavy boundary.

BC—36 to 50 inches; yellowish brown (10YR 5/4) silt loam; common medium faint brown (10YR 5/3) and distinct yellowish brown (10YR 5/6) mottles; weak coarse subangular blocky structure; friable; common fine distinct dark brown (10YR 3/3) stains; medium acid; gradual wavy boundary.

C—50 to 80 inches; yellowish brown (10YR 5/4) silt loam; few medium distinct grayish brown (10YR 5/2) and yellowish brown (10YR 5/6) mottles; massive; friable; few pebbles; neutral in the upper part and alkaline in the lower part.

The solum ranges from 45 to more than 70 inches in thickness. It typically does not contain coarse fragments.

The Ap horizon has value of 4 or 5 and chroma of 2 to 4. The Bt horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. It is silt loam or silty clay loam and has thin layers of very fine sandy loam, loam, or clay loam in the lower part.

Berks Series

The Berks series consists of moderately deep, well drained, moderately permeable or moderately rapidly permeable soils on ridgetops and hillsides. These soils formed in material weathered from shale, siltstone, and sandstone. Slopes range from 2 to 70 percent.

Berks soils are similar to Mertz soils and commonly are adjacent to Gilpin, Westmoreland, Lowell, and Rigley soils. Mertz soils contain chert fragments in the upper part of the solum. Gilpin, Westmoreland, Lowell, and Rigley soils are in landscape positions similar to those of the Berks soils. All of the associated soils contain fewer coarse fragments than the Berks soils, and all but the Gilpin soils are deep over bedrock.

Typical pedon of Berks channery silt loam, 15 to 25 percent slopes, eroded, about 4 miles west of Zanesville, in Springfield Township; 3,550 feet north and 550 feet east of the southwest corner of sec. 8, T. 16 N., R. 14 W.

Ap—0 to 8 inches; brown (10YR 4/3) channery silt loam, pale brown (10YR 6/3) dry; moderate medium and fine granular structure; friable; common fine roots; many faint dark grayish brown (10YR 4/2) organic coatings; common medium distinct yellowish brown (10YR 5/4) fragments of subsoil material; many worm channels; about 20 percent coarse fragments; medium acid; abrupt smooth boundary.

Bw1—8 to 16 inches; yellowish brown (10YR 5/4) very channery silt loam; moderate medium subangular blocky structure; firm; few medium roots; about 50 percent coarse fragments; strongly acid; gradual wavy boundary.

Bw2—16 to 28 inches; yellowish brown (10YR 5/4) very channery silt loam; moderate medium subangular blocky structure; firm; few medium roots; about 50 percent coarse fragments; common medium distinct black (10YR 2/1) stains of iron and manganese oxide; few faint strong brown (7.5YR 5/6) clay films; very strongly acid; gradual wavy boundary.

BC—28 to 35 inches; yellowish brown (10YR 5/4) very channery silt loam; moderate coarse subangular blocky structure; firm; about 50 percent coarse olive brown (2.5YR 4/4) fragments of siltstone; very strongly acid; clear wavy boundary.

Cr—35 to 47 inches; light olive brown (2.5Y 5/4), soft, fractured, laminated siltstone and fine grained sandstone bedrock; rippable.

R—47 to 49 inches; hard, fractured siltstone and sandstone bedrock.

The depth to bedrock is 20 to 40 inches. The content of fragments of shale, thin, flat siltstone, or fine grained sandstone ranges from 15 to 50 percent in the Ap horizon and from 15 to 75 percent in the B horizon.

The Ap horizon has value of 3 to 5 and chroma of 2 to 4. Some pedons have an A horizon. This horizon has value of 2 and chroma of 1. The B horizon has hue of 5YR or 2.5YR, value of 4 to 6, and chroma of 3 to 8, but the hue of 5YR is restricted to the lower part. The B horizon is silt loam, loam, or silty clay loam in the fine-earth fraction. The Cr horizon has hue of 5YR to 2.5Y, value of 4 to 6, and chroma of 2 to 6.

Bethesda Series

The Bethesda series consists of deep, well drained soils that formed in extremely acid to strongly acid, excavated fine earth material and coarse rock fragments in areas used for surface mining of coal. The fine earth material is mainly weathered shale, and the coarse rock fragments are mainly siltstone, fine grained sandstone, and hard shale. Permeability is moderately slow. Slopes range from 1 to 70 percent.

Bethesda soils are similar to Fairpoint soils and are commonly adjacent to Westmoreland and Morristown soils. Fairpoint soils are mine spoil. They are less acid than the Bethesda soils. Westmoreland soils are on nearby unmined hillsides. They are less stony than the Bethesda soils. Morristown soils are in landscape positions similar to those of the Bethesda soils. They are alkaline.

Typical pedon of Bethesda shaly silt loam, 1 to 15 percent slopes, about 2 miles northwest of White Cottage, in Springfield Township; 900 feet north and 400 feet west of the southeast corner of sec. 6, T. 15 N., R. 14 W.

A—0 to 1 inch; dark grayish brown (2.5Y 4/2) shaly silt loam, light brownish gray (2.5Y 6/2) dry; moderate thin platy structure; friable; many medium pores; about 30 percent soft shale chips; extremely acid; clear smooth boundary.

C1—1 to 12 inches; variegated dark grayish brown (2.5Y 4/2), gray (N 5/0), and yellowish brown (10YR 5/6) very shaly silty clay loam; massive; friable; patchy dark reddish brown (5YR 3/2), hard mineral coatings on shale and siltstone fragments; about 40 percent partially weathered shale, siltstone, and coal chips; extremely acid; gradual wavy boundary.

C2—12 to 33 inches; olive gray (5Y 4/2) extremely channery clay loam; massive; friable; continuous thick dark reddish brown (5YR 3/2), hard mineral coatings on the surface of shale and siltstone fragments; about 70 percent shale, siltstone, and sandstone fragments and a few stones; extremely acid; clear wavy boundary.

C3—33 to 50 inches; yellowish brown (10YR 5/4) very channery clay loam and very channery loam; massive; firm; about 35 percent shale, siltstone, and sandstone fragments; extremely acid; clear wavy boundary.

C4—50 to 60 inches; dark grayish brown (5YR 4/2) very channery silty clay loam; massive; firm; about 35 percent coarse fragments; strongly acid.

The depth to bedrock is more than 5 feet. The coarse fragments are shale, sandstone, siltstone, and coal. They are mostly gravel or channers, but some are flagstones and boulders. The content of coarse fragments ranges from 20 to 35 percent in the A horizon and from 35 to 80 percent in the C horizon. The average content of coarse fragments in the C horizon is 45 percent.

The A horizon has hue of 7.5YR to 2.5Y or is neutral in hue. It has value of 4 to 6 and chroma of 0 to 8. The A horizon is dominantly shaly or flaggy silty clay loam or silt loam, but in some pedons it is channery or gravelly silty clay loam, clay loam, silt loam, or loam. The C horizon has hue of 7.5YR to 5Y or is neutral in hue. It has value of 3 to 6 and chroma of 0 to 8. The C horizon is the very shaly, extremely shaly, very gravelly, extremely gravelly, very channery, and extremely channery analogs of silty clay loam, clay loam, silt loam, or loam.

Brookside Series

The Brookside series consists of deep, moderately well drained soils on benched foot slopes below the steeper hillsides. These soils formed in colluvium derived from clay shale and siltstone. Permeability is moderately slow. Slopes range from 8 to 40 percent.

Brookside soils are similar to Lowell and Guernsey soils and commonly are adjacent to Claysville soils. Guernsey soils have low-chroma mottles that are closer to the surface than those of the Brookside soils. The well drained Lowell soils are not so wet as the Brookside soils. The somewhat poorly drained Claysville soils are on benches. They have a surface layer that is darker than that of the Brookside soils.

Typical pedon of Brookside silty clay loam, 15 to 40 percent slopes, about 1.1 miles southwest of Gaysport, in Blue Rock Township; 6,000 feet southwest of the intersection of State Route 376 and State Route 60, and 120 feet southeast of State Route 60; in sec. 29, T. 12 N., R. 12 W.

A—0 to 3 inches; dark brown (10YR 3/3) silty clay loam, light brownish gray (10YR 6/2) dry; moderate medium granular structure; friable; many fine and medium roots; dark grayish brown (10YR 4/2) organic coatings on peds; about 10 percent gravel and stones; strongly acid; clear smooth boundary.

AB—3 to 10 inches; brown (10YR 4/3) silty clay loam; moderate coarse granular structure; friable; many medium and fine roots; dark grayish brown (10YR 4/2) organic coatings on peds; about 10 percent gravel and stones; very strongly acid; clear smooth boundary.

Bt1—10 to 16 inches; yellowish brown (10YR 5/4) silty clay loam; moderate medium subangular blocky structure; friable; common medium and fine roots; brown (10YR 4/3) organic coatings on peds; about 10 percent gravel and stones; strongly acid; gradual smooth boundary.

Bt2—16 to 24 inches; yellowish brown (10YR 5/6) gravelly silty clay; moderate medium subangular blocky structure; firm; common medium and fine roots; many distinct brown (10YR 5/3) clay films on peds; about 15 percent gravel and stones; strongly acid; clear smooth boundary.

Bt3—24 to 30 inches; yellowish brown (10YR 5/4) channery silty clay; common medium distinct gray (10YR 5/1) and yellowish brown (10YR 5/8) mottles; moderate coarse subangular blocky structure; firm; few fine and medium roots; many distinct grayish brown (10YR 5/2) clay films on peds; about 15 percent channers and stones; strongly acid; gradual smooth boundary.

Bt4—30 to 45 inches; yellowish brown (10YR 5/4) channery silty clay loam; common medium distinct gray (10YR 5/1) mottles; moderate coarse prismatic structure; firm; few fine roots; common distinct gray (10YR 5/1) clay films on faces of peds; about 20 percent coarse fragments; strongly acid; gradual smooth boundary.

BC—45 to 63 inches; yellowish brown (10YR 5/4) channery silty clay loam; massive; common coarse distinct gray (10YR 5/1) and yellowish brown (10YR 5/6) mottles; firm; about 20 percent channers and stones; strongly acid; abrupt smooth boundary.

C—63 to 70 inches; very dark grayish brown (10YR 3/2) channery silty clay loam; massive; very firm; common medium distinct black (10YR 2/1) stains of iron and manganese oxide; about 15 percent channers and stones; medium acid.

The thickness of the solum ranges from 40 to 80 inches. The depth to bedrock is more than 60 inches. The content of rock fragments is less than 15 percent in the A horizon, 5 to 25 percent in the Bt horizon, and 0 to 35 percent in the BC and C horizons.

The Ap horizon has value of 3 or 4 and chroma of 2 or 3. Some pedons have a BE horizon. The Bt horizon has hue of 10YR, 7.5YR, or 2.5YR, value of 4 or 5, and chroma of 3 to 6. It is silty clay loam, silty clay, clay, or the gravelly or channery analogs of those textures. The BC and C horizons have hue of 7.5YR, 10YR, or 2.5YR, value of 3 to 5, and chroma of 2 to 6. They are commonly mottled. They are silty clay loam, silty clay, clay, or the channery analogs of those textures.

Chagrin Series

The Chagrin series consists of deep, well drained, moderately permeable soils on the higher parts of flood plains. These soils formed in alluvial sediments along the major streams. They are subject to only rare flooding because of flood control provided by the dams of the Muskingum Conservancy District reservoirs. Slopes range from 0 to 3 percent.

Chagrin soils are similar to Tioga, Lobdell, and Stonelick soils and are commonly adjacent to Lindside, Nolin, and Chavies soils. Nolin, Lindside, and Lobdell soils are on bottom land and are more frequently flooded than the Chagrin soils. Nolin soils have less sand and more silt in the subsoil than the Chagrin soils. Lindside and Lobdell soils have gray mottles in the lower part of the subsoil and are moderately well drained. Stonelick and Tioga soils have less clay in the subsoil than the Chagrin soils. Chavies soils are on nearby terraces. They have an argillic horizon.

Typical pedon of Chagrin loam, rarely flooded, about 3 miles northeast of Dresden, in Cass Township; 600 feet north of the intersection of Gene Cox Drive and Burvil Road, and 500 feet east; T. 3 N., R. 7 W.

Ap1—0 to 7 inches; dark grayish brown (10YR 4/2) loam, light brownish gray (10YR 6/2) dry; moderate fine granular structure; friable; many fine roots; very dark grayish brown (10YR 3/2) organic coatings on peds; medium acid; clear smooth boundary.

Ap2—7 to 12 inches; dark grayish brown (10YR 4/2) loam; moderate medium granular structure; friable; many fine roots; slightly acid; clear wavy boundary.

Bw1—12 to 20 inches; dark yellowish brown (10YR 4/4) silt loam; moderate medium subangular blocky structure; friable; common fine roots; dark grayish brown (10YR 4/2) organic coatings and wormcasts; slightly acid; gradual wavy boundary.

Bw2—20 to 30 inches; brown (7.5YR 4/4) loam; moderate medium subangular blocky structure; friable; common fine roots; slightly acid; gradual wavy boundary.

Bw3—30 to 43 inches; brown (7.5YR 4/4) fine sandy loam; moderate coarse subangular blocky structure; friable; few fine roots; neutral; clear wavy boundary.

C1—43 to 51 inches; brown (7.5YR 4/4) loamy fine sand; single grained; loose; very friable; neutral; abrupt wavy boundary.

C2—51 to 77 inches; yellowish brown (10YR 5/4) fine sand; single grained; loose; medium acid; abrupt wavy boundary.

C3—77 to 83 inches; brown (7.5YR 4/4) sandy loam; moderate coarse subangular blocky structure; very friable; medium acid.

The thickness of the solum ranges from 24 to 48 inches. The content of coarse fragments, mostly pebbles, ranges from 0 to 5 percent in the solum and from 0 to 30 percent in the C horizon.

The Ap horizon has value of 4 or 5 and chroma of 2 or 3. It is typically loam, but in some pedons it is silt loam or fine sandy loam. The B horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 or 4. Some pedons have mottles with chroma of 2 or less at a depth of more than 40 inches. The C horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 2 to 4. It is loam, fine sandy loam, sandy loam, loamy fine sand, fine sand, or the gravelly analogs of those textures.

Chavies Series

The Chavies series consists of deep, well drained soils on glacial outwash terraces along major valleys. These soils formed in loamy alluvium and in the underlying sandy and gravelly outwash deposits. Permeability is moderately rapid. Slopes range from 0 to 6 percent.

Chavies soils are similar to Chili and Watertown soils and are commonly adjacent to Cidermill, Glenford, and Chagrin soils. Chili soils have more clay and gravel in the subsoil than the Chavies soils. Watertown soils have less clay and more sand in the surface layer and subsoil than the Chavies soils. Cidermill soils are in landscape positions similar to those of the Chavies soils. They have more silt and clay in the subsoil than the Chavies soils. Glenford soils are on nearby lacustrine terraces and are moderately well drained. Chagrin soils are on nearby flood plains. They do not have an argillic horizon.

Typical pedon of Chavies loam, 0 to 2 percent slopes, 2 miles south of Zanesville, in Wayne Township; 1,000 feet east-northeast of the intersection of State Route 60 and Deitz Lane, and 200 feet south; in sec. 15, T. 12 N., R. 13 W.

Ap—0 to 12 inches; brown (10YR 4/3) loam, pale brown (10YR 6/3) dry; moderate medium platy structure parting to weak fine granular; friable; common fine roots; strongly acid; abrupt smooth boundary.

BE—12 to 15 inches; yellowish brown (10YR 5/4) loam; moderate medium platy structure parting to moderate fine subangular blocky; few fine silt coatings on faces of peds; firm; few fine roots; common brown (10YR 4/3) wormcasts; strongly acid; gradual smooth boundary.

Bt1—15 to 30 inches; yellowish brown (10YR 5/4) fine sandy loam; moderate medium subangular blocky structure; friable; common fine roots; common distinct strong brown (7.5YR 4/4) clay films on faces of peds; strongly acid; clear smooth boundary.

Bt2—30 to 42 inches; strong brown (7.5YR 4/4) fine sandy loam; weak medium subangular blocky structure; very friable; few fine roots; clay bridges between sand grains; strongly acid; clear smooth boundary.

2BC—42 to 48 inches; strong brown (7.5YR 4/4) gravelly sandy loam; weak medium subangular blocky structure; friable; about 25 percent gravel; strongly acid; gradual smooth boundary.

2C1—48 to 70 inches; dark yellowish brown (10YR 4/4) gravelly sandy loam; massive; very friable; about 25 percent gravel; strongly acid; clear smooth boundary.

2C2—70 to 80 inches; brown (10YR 5/3) gravelly loamy sand; single grained; loose; about 25 percent gravel; medium acid.

The thickness of the solum ranges from 40 to 60 inches. The content of coarse fragments ranges from 0 to 15 percent in the Ap and Bt horizons. It generally ranges from 15 to 30 percent in the 2Bt and 2C horizons, but some thin layers are as much as 50 percent gravel.

The Ap horizon has value of 4 or 5 and chroma of 2 or 3. Some pedons in a few uncultivated areas have a thin A horizon and an E horizon. The Bt horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 to 6. It is loam, fine sandy loam, or sandy loam. The 2C horizon is stratified beds of sand, loamy sand, sandy loam, or the gravelly analogs of those textures.

Chili Series

The Chili series consists of deep, well drained soils on glacial outwash terraces. These soils formed in stratified sand and gravel deposits. Permeability is moderately rapid. Slopes range from 0 to 15 percent.

Chili soils are similar to Chavies soils and are commonly adjacent to Cidermill, Rawson, and Watertown soils. Chavies soils have less gravel and clay in the upper part of the subsoil than the Chili soils. Cidermill soils are in landscape positions similar to those of the Chili soils. They are more silty in the upper part of the solum than the Chili soils. The moderately well drained Rawson soils are on the margin of lake plains in areas where the outwash deposits are underlain by lacustrine sediments. Watertown soils are in landscape positions similar to those of the Chili soils. They have more sand and less clay in the upper part of the solum than the Chili soils.

Typical pedon of Chili gravelly loam, 0 to 3 percent slopes, about 1.4 miles south of Nashport, in Licking Township; along the railroad tracks, 5,300 feet east of the crossing at Pleasant Valley Road, and 500 feet north of the tracks; T. 2 N., R. 9 W.

Ap—0 to 9 inches; dark brown (10YR 3/3) gravelly loam, pale brown (10YR 6/3) dry; weak fine granular structure; very friable; many fine roots; about 20 percent fine gravel; medium acid; abrupt smooth boundary.

Bt1—9 to 14 inches; dark yellowish brown (10YR 4/4) gravelly loam; weak medium subangular blocky structure; very friable; common fine roots; thin, very patchy clay bridges; about 30 percent fine gravel; very strongly acid; clear smooth boundary.

Bt2—14 to 24 inches; dark yellowish brown (10YR 4/4) gravelly clay loam; moderate medium subangular blocky structure; friable; few fine roots; medium continuous clay bridges; about 30 percent fine gravel; strongly acid; gradual smooth boundary.

Bt3—24 to 36 inches; dark yellowish brown (10YR 4/4) gravelly clay loam; weak coarse subangular blocky structure; friable; few fine roots; many medium distinct yellowish brown (10YR 5/4) clay bridges and coatings; about 30 percent fine gravel; strongly acid; abrupt smooth boundary.

Bt4—36 to 43 inches; brown (10YR 4/3) gravelly sandy loam; weak coarse subangular blocky structure; friable; many medium distinct yellowish brown (10YR 5/4) clay bridges and coatings; thin layer of gravelly clay loam in the lower part; about 30 percent fine gravel; slightly acid; abrupt irregular boundary.

C—43 to 60 inches; dark grayish brown (10YR 4/2) very gravelly sand; single grained; loose; about 45 percent fine gravel; strong effervescence; mildly alkaline.

The thickness of the solum ranges from 40 to 80 inches. The content of gravel is variable in most pedons because of stratification. It ranges from 0 to 30 percent in the A horizon and in the B horizon to a depth of less than 20 inches. It ranges from 15 to 50 percent in the B horizon to a depth of 20 to 40 inches and from 25 to 60 percent in the B and C horizons to a depth of more than 40 inches.

The Ap horizon has hue of 10YR or 7.5YR, value of 3 to 5, and chroma of 2 to 4. Some pedons have an A or E horizon. This horizon commonly is loam or gravelly loam, but in some pedons it is sandy loam, silt loam, or gravelly sandy loam. Some pedons have a BE horizon.

The Bt horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 to 6. It commonly is sandy loam, loam, clay loam, sandy clay loam, or the gravelly analogs of those textures. In some pedons it is silt loam or silty clay loam to a depth of 24 inches and is the very gravelly analogs of sandy loam, loam, clay loam, and sandy clay loam below a depth of 40 inches.

The C horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 2 to 6. It is uniform or is stratified with the gravelly or very gravelly analogs of loamy sand or sand.

Cidermill Series

The Cidermill series consists of deep, well drained soils on broad terraces or plains in filled valleys. These soils formed in silty deposits and in the underlying loamy glacial outwash. Permeability is moderate in the solum and rapid in the underlying material. Slopes range from 0 to 3 percent.

Cidermill soils are similar to Alford soils and are commonly adjacent to Glenford, Tioga, Nolin, Watertown, and Chavies soils. Alford soils are on terraces and ridgetops. They have silty deposits that are deeper than those of the Cidermill soils. Chavies and Watertown soils are in landscape positions similar to those of the Cidermill soils. They have more sand and less clay in the upper part of the subsoil than the Cidermill soils. Glenford soils are on lacustrine terraces and are moderately well drained. Tioga and Nolin soils are on nearby flood plains. They do not have an argillic horizon.

Typical pedon of Cidermill silt loam, 0 to 3 percent slopes, about 0.1 mile north of Frazeysburg, in Jackson Township; 1,600 feet east and 200 feet south of the northwest corner of sec. 19, T. 3 N., R. 9 W.

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; few medium distinct yellowish brown (10YR 5/4) mottles; moderate medium granular structure; friable; many fine roots; neutral; abrupt smooth boundary.

BE—8 to 16 inches; yellowish brown (10YR 5/4) silt loam; moderate fine and medium subangular blocky structure; friable; common fine roots; many distinct dark grayish brown (10YR 4/2) organic coatings on vertical faces of peds; few faint yellowish brown (10YR 5/4) clay films on faces of peds; strongly acid; gradual smooth boundary.

Bt1—16 to 24 inches; yellowish brown (10YR 5/4) silt loam; moderate medium subangular blocky structure; friable; common fine roots; many faint dark yellowish brown (10YR 4/4) clay films on faces of peds; strongly acid; gradual smooth boundary.

Bt2—24 to 36 inches; yellowish brown (10YR 5/4) silt loam; moderate coarse prismatic structure parting to moderate coarse angular blocky; friable; common faint yellowish brown (10YR 5/4) clay films on faces of peds; very strongly acid; gradual wavy boundary.

2Bt3—36 to 43 inches; yellowish brown (10YR 5/4) loam; few fine faint pale brown (10YR 6/3) mottles; weak coarse prismatic structure parting to moderate medium subangular blocky; friable; common faint dark yellowish brown (10YR 4/4) clay films on vertical faces of peds; very strongly acid; abrupt wavy boundary.

2BC—43 to 56 inches; yellowish brown (10YR 5/4) fine sandy loam; weak coarse subangular blocky structure; very friable; common faint brown (10YR 5/3) clay films on vertical faces of peds; strongly acid; abrupt smooth boundary.

2C1—56 to 62 inches; yellowish brown (10YR 5/4) loamy fine sand; many fine faint brown (10YR 5/3) and pale brown (10YR 6/3) mottles; single grained; loose; medium acid; clear smooth boundary.

2C2—62 to 80 inches; stratified sand and gravelly sand; single grained; loose; medium acid.

The thickness of the solum ranges from 40 to 72 inches. The content of coarse fragments ranges from 15 to 35 percent in the loamy and sandy layers, but there are no coarse fragments in the overlying silty mantle.

The Ap horizon has value of 4 or 5 and chroma of 2 or 3. Some pedons in uncultivated areas have A and E horizons. The BE and Bt horizons have hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. They are silt loam or silty clay loam. The 2BC horizon has colors similar to those of the Bt horizon. It is loam, fine sandy loam, sandy loam, or sandy clay loam. The 2C horizon has textures ranging from loamy fine sand to gravelly sand. In some pedons it has strata of very gravelly sand.

Cincinnati Series

The Cincinnati series consists of deep, well drained soils on glaciated ridgetops and hillsides. These soils formed in a mantle of loess and in the underlying glacial till over shale and siltstone bedrock. They have a fragipan. Permeability is moderate above the fragipan and moderately slow or slow in the fragipan. Slopes range from 2 to 15 percent.

Cincinnati soils are similar to Zanesville soils and are commonly adjacent to Alford and Homewood soils. Homewood soils are in the more dissected glaciated areas. They do not have a mantle of loess, and they have more sand and less silt in the upper part of the subsoil than the Cincinnati soils. Zanesville soils do not have glacial erratics in the lower part of the subsoil. Alford soils are on ridgetops. They do not have a fragipan.

Typical pedon of Cincinnati silt loam, 2 to 6 percent slopes, about 0.5 mile south of Gratiot, in Hopewell Township; 1,100 feet west and 650 feet north of the southeast corner of sec. 6, T. 18 N., R. 15 W.

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silt loam, light gray (10YR 7/2) dry; strong fine granular structure in the upper part and weak medium granular structure in the lower part; very friable in the upper part and friable in the lower part; many medium roots; medium acid; abrupt smooth boundary.

BE—8 to 12 inches; brown (10YR 5/3) silt loam; moderate medium subangular blocky structure; firm; common medium roots; many faint brown (10YR 5/3) silt coatings on vertical faces of peds; common distinct dark grayish brown (10YR 4/2) organic coatings on vertical faces of peds; strongly acid; clear wavy boundary.

Bt1—12 to 22 inches; yellowish brown (10YR 5/6) silt loam; moderate medium subangular blocky structure; firm; common fine roots; many faint yellowish brown (10YR 5/4) clay films on faces of peds; strongly acid; clear wavy boundary.

Bt2—22 to 28 inches; yellowish brown (10YR 5/6) silt loam; moderate medium subangular blocky structure; firm; common fine roots; many distinct brown (10YR 5/3) silt coatings and many distinct dark brown (7.5YR 4/4) clay films on faces of peds; strongly acid; clear wavy boundary.

2Btx1—28 to 40 inches; yellowish brown (10YR 5/6) silty clay loam; moderate very coarse prismatic structure; very firm, slightly brittle; few fine roots along faces of prisms; many distinct brown (7.5YR 5/4) clay films on horizontal faces of peds and many distinct grayish brown (10YR 5/2) clay films on vertical faces of peds; about 5 percent gravel; strongly acid; clear wavy boundary.

2Btx2—40 to 50 inches; yellowish brown (10YR 5/4) clay loam; moderate very coarse prismatic structure; very firm, slightly brittle; common distinct brown (7.5YR 4/4) and grayish brown (10YR 5/2) clay films on vertical faces of peds; many coarse black (10YR 2/1) concretions and stains of iron and manganese oxide; about 10 percent gravel; medium acid; clear wavy boundary.

2BC1—50 to 62 inches; yellowish brown (10YR 5/4) silty clay loam; moderate coarse prismatic structure parting to moderate medium subangular blocky; firm; common faint yellowish brown (10YR 5/4) clay films on vertical faces of peds; few fine black (10YR 2/1) concretions and stains of iron and manganese oxide; about 10 percent gravel; medium acid; clear wavy boundary.

2BC2—62 to 69 inches; yellowish brown (10YR 5/6) silty clay loam; weak coarse prismatic structure; firm; common faint yellowish brown (10YR 5/4) clay films on vertical and horizontal faces of peds; few fine black (10YR 2/1) concretions and stains of iron and manganese oxide; few medium light gray (10YR 6/1), weathered pebbles; about 10 percent gravel; strongly acid; gradual wavy boundary.

3Cr—69 to 80 inches; interbedded dark yellowish brown (10YR 4/4), soft, weathered shale and olive brown (2.5YR 4/4) siltstone bedrock; common distinct reddish brown (5YR 4/4) clay films on faces of vertical cracks and common faint grayish brown (10YR 4/2) clay films between beds; thin black (10YR 2/1) seam of weathered coal.

The thickness of the solum ranges from 48 to 120 inches. The depth to bedrock is more than 60 inches. Thickness of the loess mantle ranges from 18 to 40 inches. Depth to the fragipan ranges from 24 to 36 inches in uneroded areas. The content of coarse fragments ranges from 2 to 15 percent in the 2Btx and 2BC horizons.

The Ap horizon has value of 4 or 5 and chroma of 2 or 3. Some pedons have A and E horizons. The Bt horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. It is typically not mottled, but in some pedons it has mottles with chroma of 3 or more. The Bt horizon is silty clay loam or silt loam. Pale brown (10YR 6/4) to grayish brown (10YR 5/2) silt coatings are in the lower part of the Bt horizon of some pedons and in the upper part of the 2Btx horizon in most pedons. The 2Btx horizon has colors similar to those of the Bt horizon. It is clay loam, silt loam, or silty clay loam.

Clarksburg Series

The Clarksburg series consists of deep, moderately well drained soils on foot slopes and benches. These soils formed in colluvium derived from fine grained sandstone, siltstone, and clay shale. They have a fragipan. Permeability is moderate above the fragipan and slow or moderately slow in the fragipan. Slopes range from 8 to 15 percent.

Clarksburg soils are similar to Homewood and Omulga soils and are commonly adjacent to Coshocton, Glenford, and Rigley soils. Homewood soils have glacial erratics throughout. Omulga soils are in landscape positions similar to those of the Clarksburg soils. They do not have coarse fragments in the lower part of the solum. Coshocton soils are on hillsides above the Clarksburg soils. They do not have a fragipan. Glenford soils have fewer coarse fragments in the lower part of the subsoil than the Clarksburg soils and do not have a fragipan. Rigley soils are on nearby hillsides and are well drained. They have a higher content of sand and coarse fragments throughout than the Clarksburg soils.

Typical pedon of Clarksburg silt loam, 8 to 15 percent slopes, eroded, about 2 miles southeast of Frazeysburg, in Jackson Township; 3,400 feet southeast of the intersection of Shannon Road and Baker Road; 700 feet east of Baker Road, and 100 feet north of a fence row; in sec. 21, T. 3 N., R. 9 W.

Ap—0 to 9 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; moderate fine granular structure; friable; many fine and medium roots; dark grayish brown (10YR 4/2) organic coatings on peds; specks of yellowish brown (10YR 5/4) subsoil material; about 10 percent coarse fragments of sandstone; slightly acid; abrupt smooth boundary.

BE—9 to 12 inches; yellowish brown (10YR 5/4) silt loam; moderate fine and medium subangular blocky structure; friable; common fine and medium roots; many faint brown (10YR 5/3) silt coatings; common dark grayish brown (10YR 4/2) krotovinas and few faint dark yellowish brown (10YR 4/4) clay films on peds; about 10 percent coarse fragments of sandstone; slightly acid; clear smooth boundary.

Bt1—12 to 18 inches; yellowish brown (10YR 5/4) silty clay loam; moderate medium subangular blocky structure; firm; common fine and medium roots; many faint brown (10YR 5/3) silt coatings; many faint dark yellowish brown (10YR 4/4) clay films on peds; about 10 percent coarse fragments of sandstone; slightly acid; clear smooth boundary.

Bt2—18 to 25 inches; yellowish brown (10YR 5/4) channery clay loam; weak medium subangular blocky structure; firm; few fine roots; many faint brown (10YR 5/3) silt coatings and dark yellowish brown (10YR 4/4) clay films on peds; about 20 percent coarse fragments of sandstone; medium acid; gradual wavy boundary.

Btx1—25 to 33 inches; yellowish brown (10YR 5/4) channery clay loam; common medium distinct light brownish gray (10YR 6/2) mottles; moderate medium prismatic structure parting to moderate medium platy; very firm and brittle; about 15 percent coarse fragments of sandstone and siltstone; many distinct grayish brown (10YR 5/2) and dark yellowish brown clay films on prisms; many medium prominent black (10YR 2/1) stains of iron and manganese oxide; few fine roots along faces of prisms; strongly acid; gradual wavy boundary.

Btx2—33 to 44 inches; yellowish brown (10YR 5/4) clay loam; common medium faint yellowish brown (10YR 5/6) mottles; moderate very coarse prismatic structure; very firm and brittle; many distinct grayish brown (10YR 5/2) and dark yellowish brown (10YR 4/4) clay films on prisms; many medium prominent black (10YR 2/1) stains of iron and manganese oxide; about 10 percent coarse fragments; few fine roots; strongly acid; gradual wavy boundary.

BC—44 to 65 inches; yellowish brown (10YR 5/4) silty clay loam; many medium distinct gray (10YR 6/1) and common fine faint yellowish brown (10YR 5/6) mottles; weak very coarse prismatic structure; firm; few faint dark yellowish brown (10YR 4/4) clay films; common medium prominent black (10YR 2/1) stains of iron and manganese oxide; 5 to 10 percent coarse fragments; very strongly acid; clear wavy boundary.

C1—65 to 72 inches; dark brown (7.5YR 4/4) clay loam; common medium distinct gray (10YR 5/1) and yellowish brown (10YR 5/6) mottles; massive; firm; about 10 percent coarse fragments; strongly acid; clear wavy boundary.

C2—72 to 80 inches; yellowish brown (10YR 5/4) channery clay loam; many medium distinct gray (N 6/0) and few medium faint yellowish brown (10YR 5/6) mottles; massive; firm; about 20 percent coarse fragments of sandstone; strongly acid.

The thickness of the solum ranges from 50 to 70 inches. Depth to the fragipan ranges from 24 to 36 inches. The content of coarse fragments of fine grained sandstone or siltstone ranges from 0 to 20 percent by volume in the Bt horizon above the fragipan, from 5 to 30 percent in the Btx horizon, and from 5 to 60 percent in the BC and C horizons.

The Ap horizon has hue of 10YR and value of 4 or 5. The A horizon typically is silt loam, but in some pedons it is loam. The Bt horizon has hue of 10YR or 7.5YR and chroma of 4 to 6. It is silt loam, clay loam, silty clay loam, or the channery analogs of those textures. The Btx horizon has hue of 10YR, value of 4 or 5, and chroma of 4 to 6. It is silt loam, clay loam, silty clay loam, or the channery analogs of those textures. The C horizon has value of 4 or 5. It is silt loam, clay loam, silty clay loam, or the channery or very channery analogs of those textures.

Claysville Series

The Claysville series consists of deep, somewhat poorly drained soils on benches and foot slopes below steep hillsides. These soils formed in colluvium derived from clay shale, limestone, and siltstone. Permeability is slow. Seepage from limestone outcrops contributes to the wetness of the soils. Slopes range from 8 to 15 percent.

Claysville soils are commonly adjacent to Berks, Brookside, Gilpin, Guernsey, and Lowell soils. Guernsey and Brookside soils are in landscape positions similar to those of the Claysville soils but are on the more convex parts of benches. They do not have a mollic epipedon. Berks soils have less clay and a higher content of coarse fragments than the Claysville soils. Berks and Gilpin soils are moderately deep. Berks, Gilpin, and Lowell soils are well drained and are generally on the steeper slopes.

Typical pedon of Claysville silty clay loam, in an area of Claysville-Guernsey silty clay loams, 8 to 15 percent slopes, about 3.5 miles east of Gaysport, in Blue Rock Township; 2,400 feet east of the intersection of Imlay Road and Cutler Lake Road and 300 feet north of Cutler Lake Road; in sec. 24, T. 12 N., R. 12 W.

A1—0 to 8 inches; very dark grayish brown (10YR 3/2) silty clay loam, gray (10YR 5/1) dry; strong medium granular structure; friable; many fine roots; many faint very dark gray (10YR 3/1) organic coatings on faces of peds; neutral; clear smooth boundary.

A2—8 to 13 inches; very dark grayish brown (10YR 3/2) silty clay, gray (10YR 5/1) dry; strong coarse granular structure; friable; many fine roots; many faint very dark gray (10YR 3/1) organic coatings on faces of peds; neutral; clear smooth boundary.

BA—13 to 22 inches; dark grayish brown (2.5Y 4/2) silty clay; common fine prominent yellowish brown (10YR 5/4) mottles; moderate fine prismatic structure parting to moderate fine subangular blocky; firm; many fine roots; many distinct very dark gray (10YR 3/1) organic coatings on faces of peds; neutral; clear smooth boundary.

Bw1—22 to 38 inches; light olive brown (2.5Y 5/4) silty clay loam; many coarse prominent grayish brown (10YR 5/2) and yellowish brown (10YR 5/6) mottles; moderate medium prismatic structure parting to moderate medium subangular blocky; firm; common fine roots; few distinct grayish brown (2.5Y 5/2) coatings on faces of peds; common very fine very dark brown (10YR 2/2), soft stains and concretions of iron and manganese oxide; few slickensides; neutral; gradual smooth boundary.

Bw2—38 to 45 inches; light olive brown (2.5Y 5/4) silty clay loam; common medium distinct yellowish brown (10YR 5/6) mottles; moderate coarse prismatic structure; firm; common fine roots; few distinct grayish brown (2.5Y 5/2) coatings on faces of peds; common fine very dark brown (10YR 2/2), soft stains and concretions of iron and manganese oxide; few slickensides; about 10 percent rock fragments; neutral; clear smooth boundary.

BC—45 to 54 inches; light brownish gray (10YR 6/2) shaly silty clay; common medium prominent olive yellow (2.5Y 6/6) mottles; weak coarse subangular blocky structure; firm; few medium roots; about 20 percent light yellowish brown (2.5Y 6/4) fragments of shale and siltstone; neutral; clear wavy boundary.

C1—54 to 75 inches; light brownish gray (2.5Y 6/2) silty clay loam; common coarse prominent dark yellowish brown (10YR 3/4) mottles; massive; firm; few medium roots; about 5 percent light yellowish brown (2.5Y 6/4) fragments of shale and siltstone; neutral; clear wavy boundary.

C2—75 to 84 inches; yellowish brown (10YR 5/4) shaly silty clay loam; common medium prominent gray (10YR 6/1) mottles; massive; firm; about 20 percent light yellowish brown (2.5Y 6/4) fragments of shale and siltstone; neutral within a depth of 80 inches; slight effervescence and mildly alkaline at a depth of more than 80 inches.

The thickness of the solum ranges from 40 to 60 inches. The depth to weathered, soft clay shale, siltstone, or limestone bedrock ranges from 60 to 100 inches. The content of rock fragments ranges from 0 to 20 percent in the subsoil and from 0 to 30 percent in the C horizon.

The mollic epipedon is 10 to 16 inches thick. Some pedons in cultivated areas have an Ap horizon. The surface layer is dominantly silty clay loam, but in some pedons it is silty clay. It has value and chroma of 2 or 3. The Bw horizon has hue of 7.5YR, 10YR, or 2.5Y, value of 4 to 6, and chroma of 2 to 4. It is silty clay loam, silty clay, clay, or the channery, gravelly, or shaly analogs of those textures. The C horizon has hue of 5YR, 7.5YR, 10YR, or 2.5Y, value of 4 to 6, and chroma of 2 to 4. It is silty clay loam, silty clay, clay, or the channery, gravelly, or shaly analogs of those textures.

Coshocton Series

The Coshocton series consists of deep, moderately well drained, moderately slowly permeable or slowly permeable soils on the concave lower parts of hillsides and on the concave parts of ridgetops. These soils formed in colluvium and residuum derived from shale, siltstone, and sandstone. Slopes range from 8 to 40 percent.

Coshocton soils are similar to Keene soils and are commonly adjacent to Guernsey, Rigley, Homewood, Omulga, and Westmoreland soils. Rigley and Westmoreland soils are on the more convex parts of hillsides and are well drained. Keene soils are on ridgetops. They have more silt and a lower content of coarse fragments in the upper part of the profile than the Coshocton soils. Guernsey soils are on benches. They have more clay in the subsoil than the Coshocton soils. Omulga and Homewood soils have a fragipan. Omulga soils are on foot slopes, and Homewood soils are on glaciated landforms.

Typical pedon of Coshocton silt loam, 15 to 25 percent slopes, about 4.5 miles southeast of Nashport, in Licking Township; 1,000 feet south of the intersection of Pleasant Valley Road and Sportsman Center Road; T. 2 N., R. 9 W.

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; moderate fine and very fine granular structure; friable; common fine roots; very dark gray (10YR 3/1) in the upper 3 inches; about 5 percent coarse fragments; very strongly acid; abrupt smooth boundary.

BE—8 to 12 inches; yellowish brown (10YR 5/4) silt loam; moderate medium subangular blocky structure; firm; few fine roots; many faint brown (10YR 5/3) coatings; about 5 percent coarse fragments; very strongly acid; gradual wavy boundary.

Bt1—12 to 20 inches; yellowish brown (10YR 5/4) clay loam; moderate medium and coarse subangular blocky structure; firm; few fine roots; many faint yellowish brown (10YR 5/4) clay films; about 10 percent coarse fragments; very strongly acid; clear smooth boundary.

Bt2—20 to 29 inches; yellowish brown (10YR 5/4) silty clay loam; many medium distinct grayish brown (10YR 5/2) and common medium distinct yellowish brown (10YR 5/6) mottles; moderate medium prismatic structure parting to weak medium subangular blocky; firm; few fine roots; many faint brown (10YR 5/3) coatings; about 5 percent coarse fragments; very strongly acid; gradual wavy boundary.

BC—29 to 40 inches; yellowish brown (10YR 5/4) silty clay loam; many medium distinct gray (10YR 6/1) and many medium distinct yellowish brown (10YR 5/6) mottles; moderate coarse prismatic structure parting to weak medium subangular blocky; firm; many faint light brownish gray (2.5Y 6/2) clay films on faces of prisms; about 10 percent coarse fragments; strongly acid; gradual wavy boundary.

C—40 to 65 inches; dark yellowish brown (10YR 4/4) silty clay loam; many medium distinct grayish brown (10YR 5/2) mottles; massive; very firm; about 5 percent coarse fragments; strongly acid; clear wavy boundary.

Cr—65 to 80 inches; dark gray (10YR 4/1) and very dark grayish brown (10YR 3/2), soft shale bedrock; very firm; very strongly acid.

The thickness of the solum ranges from 24 to 50 inches. The depth to bedrock ranges from 40 to 84 inches. The content of coarse fragments of shale, siltstone, or sandstone increases with increasing depth. It ranges from 2 to 20 percent in the upper part of the solum, from 10 to 35 percent in the lower part, and from 2 to 60 percent in the C horizon.

The Ap horizon has chroma of 2 to 4. Some pedons have an A horizon. The upper part of the Bt horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. It is silty clay loam, silt loam, clay loam, or sandy clay loam. The lower part of the Bt horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 2 to 6. It is silty clay, silty clay loam, clay loam, loam, or the shaly or channery analogs of those textures. The C horizon has hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 3 to 6. It is silty clay loam, silty clay, or the channery or very channery analogs of those textures.

Fairpoint Series

The Fairpoint series consists of deep, well drained soils that formed in medium acid to neutral excavated mine spoil in areas used for surface mining of coal. The mine spoil is siltstone, shale, and sandstone that has been mixed during mining. Permeability is moderately slow. Slopes range from 1 to 70 percent.

Fairpoint soils are similar to Bethesda and Morristown soils and are commonly adjacent to the loamy Udorthents. Bethesda soils are more acid than the Fairpoint soils. Morristown soils are more alkaline than the Fairpoint soils. Udorthents have fewer coarse fragments than the Fairpoint soils.

Typical pedon of Fairpoint silty clay loam, 1 to 15 percent slopes, about 3 miles northwest of Roseville, in Newton Township; 1,700 feet south and 300 feet east of the center of sec. 21, T. 11 N., R. 14 W.

Ap—0 to 7 inches; dark brown (10YR 3/3) and yellowish brown (10YR 5/6) silty clay loam, pale brown (10YR 6/3) dry; weak medium and coarse subangular blocky structure; firm; many fine roots; about 10 percent shale fragments; medium acid; abrupt smooth boundary.

C1—7 to 16 inches; variegated yellowish brown (10YR 5/4) (80 percent) and dark grayish brown (10YR 4/2) (20 percent) shaly silty clay loam; massive; firm; few fine roots; about 30 percent coarse fragments, mostly shale, siltstone, and fine grained sandstone; medium acid; abrupt wavy boundary.

C2—16 to 30 inches; variegated dark gray (10YR 4/1) (60 percent) and brown (10YR 4/3) (40 percent) very shaly silty clay loam; massive; very firm; about 50 percent shale fragments; medium acid; diffuse smooth boundary.

C3—30 to 60 inches; variegated dark gray (10YR 4/1) (90 percent) and dark brown (10YR 4/3) (10 percent) very shaly silty clay loam; massive; very firm; about 50 percent shale fragments; medium acid.

The depth to bedrock is more than 5 feet. In unreclaimed areas, the A horizon is gravelly or channery silty clay loam. In reclaimed areas, the A horizon is derived from natural soil material and is 4 to 12 inches thick. It is typically silty clay loam, but in some pedons it is loam, silt loam, or clay loam. The A horizon has hue of 7.5YR to 2.5YR or is neutral in hue. It has value of 3 to 6 and chroma of 0 to 6.

Some pedons in unreclaimed areas have a weakly developed Bw horizon that has subangular blocky structure. The C horizon is gravelly or very gravelly, channery to extremely channery, or shaly to extremely shaly clay loam, silty clay loam, silt loam, or loam. It has hue of 7.5YR to 5YR or is neutral in hue. It has value of 3 to 6 and chroma of 0 to 8.

Fitchville Series

The Fitchville series consists of deep, somewhat poorly drained, moderately slowly permeable soils on terraces in valleys that formerly held glacial lakes. These soils formed in silty slackwater sediments. Slopes range from 0 to 6 percent.

Fitchville soils are commonly adjacent to Glenford, Jimtown, McGary, Melvin, Newark, and Sebring soils. Jimtown and McGary soils are in landscape positions similar to those of the Fitchville soils. McGary soils have more clay in the subsoil than the Fitchville soils. Jimtown soils have more sand and gravel in the subsoil than the Fitchville soils. The poorly drained Sebring soils are on flats. Glenford soils are moderately well drained and are in landscape positions similar to those of the Fitchville soils or are on more dissected landforms. Newark and Melvin soils are on nearby flood plains. They do not have an argillic horizon.

Typical pedon of Fitchville silt loam, 0 to 2 percent slopes, about 4.2 miles southwest of Dresden, in Muskingum Township; 700 feet north and 1,700 feet west of the southeast corner of sec. 4, T. 2 N., R. 8 W.

Ap—0 to 10 inches; dark grayish brown (10YR 4/2) silt loam, light gray (10YR 7/2) dry; few fine distinct yellowish brown (10YR 5/4) mottles; moderate medium granular structure; friable; many fine roots; many faint grayish brown (10YR 5/2) organic coatings on faces of peds; slightly acid; abrupt smooth boundary.

BE—10 to 20 inches; brown (10YR 5/3) silty clay loam; common medium distinct yellowish brown (10YR 5/6) and many medium faint grayish brown (10YR 5/2) mottles; moderate medium subangular blocky structure; friable; common fine roots; many distinct gray (10YR 6/1) silt coatings on faces of peds; very strongly acid; clear wavy boundary.

Bt1—20 to 27 inches; brown (10YR 5/3) silty clay loam; common fine distinct yellowish brown (10YR 5/6) and many medium faint grayish brown (10YR 5/2) mottles; moderate coarse subangular blocky structure; firm; few fine roots; many faint light brownish gray (2.5Y 6/2) clay films on faces of peds; strongly acid; gradual wavy boundary.

Bt2—27 to 32 inches; pale brown (10YR 6/3) silty clay loam; many fine distinct yellowish brown (10YR 5/6) mottles; moderate coarse subangular blocky structure; firm; few fine roots; few fine black (10YR 2/1) stains of iron and manganese oxide; many faint light brownish gray (2.5Y 6/2) clay films on faces of peds; strongly acid; gradual wavy boundary.

Bt3—32 to 40 inches; pale brown (10YR 6/3) silty clay loam; many medium distinct yellowish brown (10YR

5/6) and many fine distinct light brownish gray (2.5Y 6/2) mottles; moderate coarse prismatic structure; firm; common fine black (10YR 2/1) stains of iron and manganese oxide; common faint light brownish gray (2.5Y 6/2) clay films on faces of peds; medium acid; clear smooth boundary.

BC—40 to 58 inches; brown (10YR 5/3) silty clay loam; common fine distinct yellowish brown (10YR 5/6) mottles; weak coarse prismatic structure; firm; many distinct gray (10YR 6/1) clay films on vertical faces of peds; thin strata of silty clay; slightly acid; gradual wavy boundary.

C—58 to 70 inches; yellowish brown (10YR 5/4) silty clay loam; common fine distinct yellowish brown (10YR 5/6) and many medium distinct gray (10YR 6/1) mottles; massive; firm; laminated; neutral.

The thickness of the solum ranges from 30 to 70 inches. The Ap horizon has value of 4 or 5. Some pedons in uncultivated areas have A and E horizons. The Bt horizon has hue of 10YR or 2.5YR, value of 4 to 6, and chroma of 1 to 6. It has few to many mottles that have coatings with dominant chroma of 2. It is silty clay loam or silt loam that has thin layers of loam or clay loam. Some pedons have a thin, brittle horizon. The C horizon has colors similar to those of the Bt horizon. It is silt loam or silty clay loam that has thin layers of loam, fine sandy loam, or silty clay.

Frankstown Variant

The Frankstown Variant consists of moderately deep, well drained, moderately permeable soils on ridgetops in an area that is known locally as Flint Ridge. These soils formed in a mixture of loess and underlying material weathered from flinty limestone. Slopes range from 3 to 8 percent.

Frankstown Variant soils are similar to Gilpin soils and are commonly adjacent to Keene and Mertz soils. Gilpin and Keene soils are in landscape positions similar to those of the Frankstown Variant soils. Gilpin soils are moderately deep over sandstone or siltstone. Keene soils are moderately well drained. They are underlain by clay shale material. Mertz soils are on steep slopes and are downslope from the Frankstown Variant soils. They are deep and have many fragments of fractured flint in the subsoil.

Typical pedon of Frankstown Variant silt loam, in an area of Frankstown Variant-Mertz complex, 3 to 8 percent slopes, about 3.5 miles north-northeast of Gratiot, in Hopewell Township; 200 feet south and 200 feet west of the center of sec. 6, T. 1 N., R. 9 W.

A—0 to 4 inches; dark brown (10YR 3/3) silt loam, pale brown (10YR 6/3) dry; weak fine granular structure; friable; many coarse to fine roots; about 10 percent cherty angular gravel and stones; slightly acid; abrupt smooth boundary.

BE—4 to 9 inches; yellowish brown (10YR 5/4) silt loam; moderate medium subangular blocky structure parting to weak thin platy; friable; many coarse to fine roots; about 10 percent cherty angular gravel and stones; medium acid; clear smooth boundary.

Bt1—9 to 16 inches; yellowish brown (10YR 5/6) cherty silt loam; moderate medium subangular blocky structure; firm; common fine and medium roots; common faint brown (10YR 4/4) clay films on faces of peds; about 15 percent cherty gravel and stones; strongly acid; clear smooth boundary.

Bt2—16 to 22 inches; yellowish brown (10YR 5/4) cherty silt loam; moderate fine subangular blocky structure; firm; few fine roots; many distinct strong brown (7.5YR 5/6) clay films on faces of peds; about 20 percent cherty gravel and stones; strongly acid; abrupt irregular boundary.

2R—22 to 25 inches; light gray (N 7/0) to very dark gray (N 3/0), hard flint bedrock.

The thickness of the solum and the depth to flint bedrock range from 20 to 40 inches. Rock fragments are mostly angular coarse gravel, cobbles, and stones of flint. The content of coarse fragments ranges from 0 to 15 percent in the upper part of the solum and from 20 to 60 percent in the lower part. Pedons in cultivated areas have an Ap horizon.

The A horizon has value of 3 or 4 and chroma of 1 to 3. The Bt horizon has hue of 7.5YR or 10YR, value of 5, and chroma of 4 to 6. It is silt loam, silty clay loam, or the cherty or very cherty analogs of those textures.

Gilpin Series

The Gilpin series consists of moderately deep, well drained soils on ridgetops and hillsides. These soils formed in material weathered from interbedded siltstone and sandstone. Permeability is moderate. Slopes range from 2 to 70 percent.

Gilpin soils are similar to Frankstown Variant and Westmoreland soils and commonly are adjacent to Berks, Lowell, Rigley, and Upshur soils. Berks soils have a higher content of coarse fragments in the subsoil than the Gilpin soils. Frankstown Variant soils have chert fragments in the subsoil. Lowell, Rigley, Upshur, and Westmoreland soils are deep over bedrock. Lowell, Upshur, and Rigley soils are in landscape positions similar to those of the Gilpin soils.

Typical pedon of Gilpin silt loam, 2 to 8 percent slopes, about 2 miles southwest of Frazeysburg, in Licking Township; 1 mile south of the intersection of

Canal Road and Vickers Hill Road, 600 feet south of the township line, along Vicker Hill Road, and 450 feet east of the road; T. 2 N., R. 9 W.

Ap—0 to 9 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; moderate fine granular structure; friable; many fine and medium roots; common medium distinct yellowish brown (10YR 5/4) specks of subsoil material; strongly acid; abrupt smooth boundary.

Bt1—9 to 16 inches; yellowish brown (10YR 5/6) silt loam; moderate fine subangular blocky structure; friable; common fine roots; many distinct dark brown (10YR 4/4) clay films; strongly acid; clear smooth boundary.

Bt2—16 to 23 inches; yellowish brown (10YR 5/4) clay loam; moderate medium subangular blocky structure; friable; many faint brown (7.5YR 5/4) clay films; many light olive brown (2.5Y 5/4), very soft siltstone fragments; 5 percent coarse siltstone fragments; strongly acid; clear wavy boundary.

Bt3—23 to 30 inches; yellowish brown (10YR 5/4) channery clay loam; moderate coarse subangular blocky structure parting to moderate medium platy; friable; common faint brown (7.5YR 5/4) clay films on vertical faces of peds; many light olive brown (2.5Y 5/4), soft siltstone fragments; 15 percent coarse siltstone fragments; strongly acid; abrupt smooth boundary.

R—30 to 40 inches; light olive brown (2.5Y 5/4), interbedded, fractured siltstone, soft shale, and fine grained sandstone bedrock; few distinct brown (7.5YR 5/4) clay films on vertical faces of fractures.

The thickness of the solum ranges from 18 to 36 inches. The depth to bedrock ranges from 20 to 40 inches. The content of flagstones and smaller fragments of siltstone, shale, or fine grained sandstone ranges from 5 to 15 percent in the A horizon and from 5 to 40 percent in individual subhorizons of the B horizon. Some pedons have a few limestone fragments.

The Ap horizon has value of 4 or 5 and chroma of 2 to 4. Pedons in uncultivated areas have thin A and E horizons. Some pedons have a BE horizon. The Bt horizon has hue of 7.5YR, 10YR, or 2.5Y, value of 4 or 5, and chroma of 4 to 6. It is loam, clay loam, silt loam, silty clay loam, or the shaly or channery analogs of those textures. Individual subhorizons are very shaly or very channery. Some pedons have a thin BC, C, or Cr horizon.

Glenford Series

The Glenford series consists of deep, moderately well drained, moderately slowly permeable soils on terraces in former glacial lake valleys. These soils formed in silty lacustrine sediments. Slopes range from 0 to 35 percent.

Glenford soils are commonly adjacent to Alford, Markland, Fitchville, Omulga, Chavies, Cidermill, and Lakin soils. Alford, Chavies, Cidermill, and Lakin soils are well drained. Alford soils are on terraces and ridgetops and are not stratified. Chavies and Cidermill soils are on glacial outwash terraces. Lakin soils are on dunes. Fitchville soils are somewhat poorly drained and are in the flatter areas. Omulga soils are on foot slopes. They have a fragipan. Markland soils are in landscape positions similar to those of the Glenford soils. They contain more clay than the Glenford soils.

Typical pedon of Glenford silt loam, 0 to 2 percent slopes, about 1 mile north of Frazeysburg, in Jackson Township; 1,800 feet north of the intersection of Eddelblute Drive and Scout Road, and 400 feet east; T. 3 N., R. 9 W.

Ap—0 to 10 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; weak medium granular structure; friable; many fine roots; strongly acid; abrupt smooth boundary.

Bt1—10 to 18 inches; yellowish brown (10YR 5/4) silt loam; moderate medium subangular blocky structure; friable; common fine roots; many faint brown (10YR 5/3) silt coatings and few distinct dark grayish brown (10YR 4/2) clay films on faces of peds; very strongly acid; clear smooth boundary.

Bt2—18 to 26 inches; dark yellowish brown (10YR 4/4) silt loam; many medium distinct grayish brown (10YR 5/2) and yellowish brown (10YR 5/6) mottles; moderate fine prismatic structure; firm; common fine roots; many prominent light brownish gray (2.5Y 6/2) silt coatings and common faint brown (10YR 4/3) clay films on faces of peds; strongly acid; clear smooth boundary.

Bt3—26 to 34 inches; dark yellowish brown (10YR 4/4) silt loam; many medium distinct grayish brown (10YR 5/2) and yellowish brown (10YR 5/6) mottles; moderate medium prismatic structure parting to medium platy; firm; slightly brittle; common prominent light brownish gray (2.5Y 6/2) silt coatings on vertical faces of peds and common distinct dark grayish brown (10YR 4/2) clay films on faces of peds; strongly acid; abrupt wavy boundary.

BC—34 to 50 inches; yellowish brown (10YR 5/4) silty clay loam; many medium distinct gray (10YR 6/1) and yellowish brown (10YR 5/6) mottles; moderate medium prismatic structure parting to moderate medium angular blocky; firm; common black (10YR 2/1) stains of iron and manganese oxide; many distinct gray (10YR 6/1) clay films on vertical faces of peds; neutral; clear wavy boundary.

C—50 to 60 inches; brown (10YR 4/3) silty clay loam; massive; firm; gray (10YR 6/1) clay films on vertical faces of widely spaced cracks; light gray (10YR 7/2) streaks of calcium carbonate; strong effervescence; mildly alkaline.

The thickness of the solum ranges from 30 to 60 inches.

The Ap horizon has chroma of 2 or 3. Some pedons have an A, E, or BE horizon. The Bt horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 6. It is silty clay loam or silt loam. It has few or common high- and low-chroma mottles. In some pedons it has a thin, slightly brittle layer in the middle or lower part. The C horizon has value of 4 or 5 and chroma of 3 to 6. It is dominantly stratified silt loam and silty clay loam but includes thin strata of loam, fine sandy loam, or silty clay and lenses of very fine sand and fine sand. The content of coarse fragments ranges from 0 to 5 percent in the C horizon.

Guernsey Series

The Guernsey series consists of deep, moderately well drained, slowly permeable or moderately slowly permeable soils on benches and dissected hillsides. These soils formed in colluvium and material weathered from slightly acid to calcareous clay shale, siltstone, and thinly bedded limestone. Slopes range from 6 to 40 percent.

Guernsey soils are similar to Aaron, Brookside, and Lowell soils and are commonly adjacent to Upshur and Westmoreland soils. Aaron soils are on ridgetops and shoulders. They have fewer coarse fragments in the subsoil than the Guernsey soils. Brookside soils are on foot slopes and benches. They have a higher content of coarse fragments in the subsoil than the Guernsey soils. Lowell soils are on the steeper hillsides and are well drained. The well drained Upshur soils are in landscape positions similar to those of the Guernsey soils. They have a redder subsoil than the Guernsey soils. The well drained Westmoreland soils are on the steeper hillsides. They have more sand and less clay throughout than the Guernsey soils.

Typical pedon of Guernsey silty clay loam, in an area of Guernsey-Upshur silty clay loams, 6 to 15 percent slopes, eroded, about 4 miles southwest of New Concord, in Union Township; 2,200 feet west of the intersection of Rix Mills Road and Clay Pike, and 1,350 feet north of the road; T. 1 N., R. 5 W.

Ap—0 to 7 inches; brown (10YR 4/3) silty clay loam, light gray (10YR 7/2) dry; moderate very fine subangular blocky structure; friable; many fine roots; common flecks of light olive brown (2.5Y 5/4) silty clay subsoil material; about 5 percent coarse fragments; strongly acid; abrupt smooth boundary.

Bt1—7 to 13 inches; light olive brown (2.5Y 5/4) silty clay; moderate fine subangular blocky structure; firm; common fine roots; many distinct yellowish brown (10YR 5/4) clay films on faces of peds; about 10 percent coarse fragments; strongly acid; clear smooth boundary.

Bt2—13 to 20 inches; brown (10YR 4/3) silty clay; many medium distinct light brownish gray (10YR 6/2) mottles; moderate medium angular blocky structure; firm; common fine roots; many faint dark grayish brown (10YR 4/2) clay films on faces of peds; about 10 percent coarse fragments; slightly acid; gradual smooth boundary.

Bt3—20 to 28 inches; brown (10YR 4/3) channery silty clay; many coarse distinct grayish brown (10YR 5/2) mottles; moderate coarse angular blocky structure; firm; common fine roots; many faint dark grayish brown (10YR 4/2) clay films on faces of peds; many slickensides; about 20 percent coarse fragments; neutral; clear smooth boundary.

BC—28 to 39 inches; variegated olive gray (5YR 5/2) and dark brown (7.5YR 4/4) channery clay; weak very coarse prismatic structure; firm; weak red (10R 4/2) streaks; about 20 percent coarse fragments; slight effervescence; mildly alkaline; abrupt smooth boundary.

C—39 to 62 inches; variegated light olive brown (2.5Y 5/4) and light olive gray (5Y 6/2) channery silty clay; massive; very firm; weak red (10R 4/4) streaks; about 20 percent light gray (2.5Y 7/2) limestone fragments; strong effervescence; mildly alkaline; clear smooth boundary.

Cr—62 to 64 inches; soft clay shale bedrock.

The thickness of the solum ranges from 32 to 60 inches. The depth to bedrock is 60 to 80 inches. The depth to free calcium carbonate is more than 30 inches. The content of coarse fragments of siltstone, shale, limestone, and sandstone ranges from 0 to 15 percent in the Ap horizon, from 5 to 25 percent in the Bt horizon, and from 5 to 35 percent in the BC and C horizons.

The Ap horizon has value of 3 or 4 and chroma of 2 or 3. Some pedons have a thin, very dark A horizon and a light-colored E horizon. The A and E horizons are silt loam or silty clay loam. The Bt and BC horizons have hue of 2.5YR, 10YR, or 7.5YR, value of 4 to 6, and chroma of 3 to 6. Some thin horizons have hue of 5Y or 5YR and chroma of 1 or 2. The Bt and BC horizons are silty clay loam, silty clay, clay, or the channery or shaly analogs of those textures. The C horizon has hue of 7.5YR to 5Y or is neutral in hue. It has value of 4 to 6 and chroma of 0 to 6. It is silty clay loam, silty clay, clay, or the channery or shaly analogs of those textures.

Homewood Series

The Homewood series consists of deep, moderately well drained soils on dissected ridgetops and hillsides. These soils formed in loamy glacial till. They have a fragipan. Permeability is moderate above the fragipan and slow in the fragipan. Slopes range from 8 to 20 percent.

Homewood soils are similar to Clarksburg soils and are commonly adjacent to Cincinnati, Coshocton, and Westmoreland soils. Clarksburg soils are on foot slopes. They do not have gravelly glacial erratics. Cincinnati soils are on the less sloping ridgetops. They have more silt in the upper part of the profile than the Homewood soils. Coshocton and Westmoreland soils are on unglaciated or dissected hillsides. They do not have a fragipan.

Typical pedon of Homewood silt loam, 15 to 20 percent slopes, eroded, about 1.8 miles south of Gratiot, in Hopewell Township; about 925 feet west and 525 feet south of the northeast corner of sec. 18, T. 18 N., R. 15 W.

Ap—0 to 7 inches; brown (10YR 4/3) silt loam, light gray (10YR 7/2) dry; moderate medium granular structure; friable; many fine roots; specks of strong brown (7.5YR 5/6) subsoil material; about 2 percent gravel; very strongly acid; clear smooth boundary.

Bt1—7 to 12 inches; strong brown (7.5YR 5/6) silty clay loam; moderate medium subangular blocky structure; firm; common fine roots; many distinct yellowish brown (10YR 5/4) clay films on faces of peds; common prominent brown (10YR 4/3) organic coatings on vertical faces of peds; few brown (10YR 4/3) wormcasts; about 5 percent gravel; very strongly acid; clear wavy boundary.

Bt2—12 to 21 inches; yellowish brown (10YR 5/6) silty clay loam; moderate medium subangular blocky structure; firm; common fine roots; many distinct yellowish brown (10YR 5/4) clay films on faces of peds; about 5 percent gravel; very strongly acid; clear wavy boundary.

Bt3—21 to 28 inches; yellowish brown (10YR 5/4) clay loam; common fine distinct grayish brown (10YR 5/2) and few fine prominent strong brown (7.5YR 5/6) mottles; moderate medium prismatic structure parting to moderate coarse subangular blocky; firm; common fine roots; many faint brown (10YR 5/3) clay films on faces of peds; few medium black (10YR 2/1) stains of iron and manganese oxide; about 5 percent gravel; very strongly acid; abrupt irregular boundary.

Btx1—28 to 40 inches; yellowish brown (10YR 5/4) gravelly clay loam; few medium distinct grayish brown (10YR 5/2) and few medium distinct yellowish brown (10YR 5/6) mottles; moderate very coarse prismatic structure parting to moderate medium platy; very firm; brittle; very few roots on faces of prisms; many faint pale brown (10YR 6/3) clay films on faces of prisms; common medium black (10YR 2/1) stains of iron and manganese oxide; about 15 percent gravel; very strongly acid; clear wavy boundary.

Btx2—40 to 46 inches; yellowish brown (10YR 5/4 and 5/6) gravelly clay loam; few fine distinct grayish brown (10YR 5/2) mottles; weak very coarse prismatic structure; firm; common fine roots; common fine black (10YR 2/1) stains of iron and manganese oxide; about 20 percent gravel; strongly acid; clear wavy boundary.

BC—46 to 65 inches; yellowish brown (10YR 5/4) clay loam; common medium distinct yellowish brown (10YR 5/6) and few fine distinct grayish brown (10YR 5/2) mottles; weak coarse prismatic structure; firm; common black (10YR 2/1) stains of iron and manganese oxide; about 10 percent gravel; slightly acid; clear wavy boundary.

C—65 to 80 inches; brown (10YR 5/3) clay loam; common medium faint grayish brown (10YR 5/2) mottles; massive; firm; about 5 percent gravel; neutral.

The thickness of the solum typically ranges from 60 to 90 inches. The depth to free carbonates is more than 60 inches. Depth to the fragipan ranges from 16 to 33 inches. Some pedons have a mantle of loess as much as 16 inches thick. Coarse fragments are mostly gravel-sized fragments of sandstone and shale, but some limestone and crystalline rocks and thin, flat fragments of sandstone are in the lower part of many pedons. The content of coarse fragments ranges from 0 to 5 percent in the A horizon, from 0 to 10 percent in the Bt horizon, from 5 to 30 percent in the Btx and BC horizons, and from 5 to 35 percent in the C horizon.

The Ap horizon has chroma of 2 to 4. Some pedons have a thin A horizon and an E horizon. The Bt horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 to 6. It is loam, silt loam, clay loam, or silty clay loam. The Btx horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 to 6. It is mainly loam, silt loam, clay loam, or the gravelly analogs of those textures. The C horizon has hue of 2.5YR to 7.5YR, value of 4 or 5, and chroma of 3 to 6. It is loam, silt loam, clay loam, or the gravelly analogs of those textures.

Jimtown Series

The Jimtown series consists of deep, somewhat poorly drained, moderately permeable soils on outwash terraces and the margins of former glacial lakes. These soils formed in stratified loamy deposits that have a significant content of gravel. Slopes range from 0 to 3 percent.

Jimtown soils are commonly adjacent to Fitchville, Rawson, and Chili soils. These adjacent soils are in landscape positions similar to those of the Jimtown soils. Fitchville soils are less sandy throughout than the Jimtown soils and do not have gravel. Rawson soils are moderately well drained and are on gentle slopes. Chili soils are well drained.

Typical pedon of Jimtown loam, 0 to 3 percent slopes, about 3.5 miles southwest of Frazeysburg, in Licking Township; 2,100 feet southeast of the intersection of State Route 146 and State Route 586, and 1,200 feet north; T. 2 N., R. 9 W.

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) loam, light brownish gray (10YR 6/2) dry; dark gray (10YR 4/1) in the lower 2 inches; moderate medium granular structure; friable; about 10 percent gravel; slightly acid; abrupt smooth boundary.

Bg—8 to 12 inches; grayish brown (10YR 5/2) loam; common medium distinct yellowish brown (10YR 5/4) and few fine faint light brownish gray (10YR 6/2) mottles; weak medium subangular blocky structure; friable; about 10 percent gravel; medium acid; clear smooth boundary.

Btg—12 to 18 inches; grayish brown (10YR 5/2) loam; few medium distinct yellowish brown (10YR 5/4) mottles; moderate medium subangular blocky structure; friable; common distinct dark grayish brown (10YR 4/2) clay films on faces of peds; many medium prominent black (N 2/0) stains of iron and manganese oxide; about 10 percent gravel; medium acid; gradual smooth boundary.

Bt1—18 to 26 inches; yellowish brown (10YR 5/4) gravelly loam; many medium faint grayish brown (10YR 5/2) and few fine distinct dark grayish brown (10YR 4/2) mottles; moderate medium subangular blocky structure; friable; common faint brown (10YR 4/3) clay films on faces of peds; about 20 percent gravel; medium acid; gradual smooth boundary.

Bt2—26 to 40 inches; yellowish brown (10YR 5/4) gravelly loam; many medium distinct yellowish brown (10YR 5/8) and grayish brown (10YR 5/2) mottles; weak coarse subangular blocky structure; friable; common faint brown (10YR 4/3) clay films on faces of peds; about 20 percent gravel; medium acid; gradual smooth boundary.

BC—40 to 48 inches; yellowish brown (10YR 5/4) gravelly loam; common medium distinct grayish brown (10YR 5/2) mottles; weak coarse subangular blocky structure; friable; about 30 percent gravel; medium acid; clear smooth boundary.

C1—48 to 75 inches; yellowish brown (10YR 5/6) very gravelly loam; common medium distinct brown (10YR 5/3) and yellowish brown (10YR 5/8) mottles; weak coarse subangular blocky structure; friable; about 40 percent gravel; medium acid; clear wavy boundary.

C2—75 to 80 inches; dark gray (10YR 4/1) very gravelly sandy loam; single grained; loose; about 55 percent rounded gravel; neutral.

The thickness of the solum ranges from 35 to 48 inches. The content of gravel is variable in most pedons because of stratification. It ranges from 0 to 30 percent in the A horizon and in the B horizon to a depth of about 20 inches and from 15 to 50 percent in the B and C horizons between the depths of 20 and 40 inches. It ranges from 10 to 60 percent in individual subhorizons. It is as much as 60 percent in the B and C horizons below a depth of 40 inches.

The Ap horizon has value of 3 or 4 and chroma of 1 to 3. It is loam, silt loam, sandy loam, or the gravelly analogs of those textures. Some pedons have a BE horizon. The Bt horizon has hue of 10YR, 5Y, or 2.5Y, value of 4 to 6, and chroma of 2 to 4. It has few to many high- and low-chroma mottles. It is loam, clay loam, or the gravelly analogs of those textures. In some pedons it has thin subhorizons of sandy loam, silt loam, or silty clay loam. The C horizon has hue of 10YR, 2.5Y, or 5Y or is neutral in hue. It has value of 4 to 6 and chroma of 0 to 4. It commonly is the gravelly or very gravelly analogs of loam, sandy loam, loamy sand, or sand, but in some pedons it is sandy loam, loamy sand, or sand.

Keene Series

The Keene series consists of deep, moderately well drained soils on ridgetops and benches. These soils formed in a mantle of loess and in the underlying residuum derived from clay shale and siltstone. Permeability is moderate or moderately slow in the silty upper part and moderately slow or slow in the lower part. Slopes range from 2 to 15 percent.

Keene soils are similar to Aaron, Coshocton, and Westgate soils and commonly are adjacent to Wellston and Zanesville soils. Aaron soils have more clay in the subsoil and are less acid than the Keene soils. Coshocton soils have less silt and a higher content of coarse fragments in the upper part of the subsoil than the Keene soils. Westgate soils are red and clayey in the underlying material. Wellston soils are in the more convex landscape positions and are well drained. Zanesville soils are in landscape positions similar to those of the Keene soils. They have a dense fragipan in the subsoil.

Typical pedon of Keene silt loam, 6 to 15 percent slopes, eroded, about 6 miles southwest of Dresden, in Licking Township; 1,400 feet east of the intersection of Old Stagecoach Road and Baker Road, and 150 feet south; T. 2 N., R. 9 W.

Ap—0 to 8 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; moderate medium granular structure; friable; many fine roots; common distinct yellowish brown (10YR 5/4) flecks of subsoil material; slightly acid; abrupt smooth boundary.

BE—8 to 13 inches; yellowish brown (10YR 5/4) silt loam; moderate medium subangular blocky structure; firm; few fine roots; common faint brown (10YR 5/3) silt coatings; medium acid; clear smooth boundary.

Bt1—13 to 22 inches; yellowish brown (10YR 5/4) silty clay loam; many medium distinct light brownish gray (10YR 6/2) and many medium prominent reddish brown (5YR 4/3) mottles; moderate medium subangular blocky structure; firm; few fine roots; many faint light brownish gray (10YR 6/2) clay films on faces of peds; common medium dark brown (7.5YR 3/2) nodules; strongly acid; gradual wavy boundary.

Bt2—22 to 30 inches; yellowish brown (10YR 5/6) silty clay loam; many medium distinct light gray (10YR 6/1) and common medium prominent reddish brown (5YR 4/3) mottles; moderate coarse prismatic structure parting to moderate medium platy; firm; few fine roots; many distinct light gray (10YR 6/1) clay films on faces of peds; many medium dark brown (7.5YR 3/2) nodules; strongly acid; abrupt wavy boundary.

2Bt3—30 to 38 inches; light gray (10YR 6/1) silty clay loam; common medium distinct brown (10YR 5/3) mottles; moderate coarse prismatic structure parting to moderate thick platy; very firm; about 10 percent shale fragments; many faint light gray (5YR 6/1) clay films on vertical faces of prisms; strongly acid; clear wavy boundary.

2BC—38 to 58 inches; light olive brown (2.5Y 5/4) channery silty clay loam; common medium prominent light gray (10YR 6/1) mottles; moderate very coarse prismatic structure parting to moderate thick platy; very firm; about 20 percent shale and siltstone fragments; few distinct light gray (10YR 6/1) clay films on vertical faces of prisms; medium acid; gradual boundary.

2C—58 to 74 inches; dark grayish brown (2.5Y 4/2) clay; common medium distinct light olive brown (2.5Y 5/4) and prominent light gray (N 6/0) mottles; massive; very firm; laminated; about 5 percent coarse fragments; medium acid; clear boundary.

2Cr—74 to 80 inches; soft gray (10YR 5/1) clay shale bedrock; laminated; can be cut with a spade.

The thickness of the solum ranges from 30 to 60 inches. The depth to bedrock ranges from 50 to 84 inches. The content of coarse fragments, mainly small siltstone and shale fragments, ranges from 0 to 5 percent in the A and Bt horizons, from 5 to 15 percent in the 2Bt horizon, and from 5 to 35 percent in the 2C horizon.

The Ap horizon has value of 4 or 5 and chroma of 2 or 3. Some pedons have an A horizon. This horizon is 1 to 4 inches thick. It has value of 2 or 3 and chroma of 1 or 2. The Bt horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6. It is silt loam or silty clay loam. The 2Bt horizon has hue of 7.5YR, 10YR, 2.5Y, or 5Y, value of 4 to 6, and chroma of 1 to 6. It is silty clay, silty clay loam, or the channery analogs of those textures. The 2C horizon has hue of 10YR, 2.5Y, or 5Y, value of 4 or 5, and chroma of 1 to 4. It is silty clay loam, silty clay, clay, or the channery analogs of those textures.

Killbuck Series

The Killbuck series consists of deep, poorly drained, moderately slowly permeable soils on flood plains in areas where tributary streams enter broad, filled valleys and deposit alluvial fines. These soils formed in recent alluvium and in a buried, dark-surfaced lacustrine soil. Slopes range from 0 to 2 percent.

Killbuck soils are similar to Melvin soils and are commonly adjacent to Luray and Newark soils. Newark and Melvin soils are on flood plains, but they do not have a buried dark layer that is 6 inches or more thick. Newark soils are somewhat poorly drained. Melvin soils are poorly drained. Luray soils are in depressed areas that are subject to ponding. They have a mollic epipedon.

Typical pedon of Killbuck silt loam, occasionally flooded, about 3.5 miles southwest of Frazeysburg, in Licking Township; 2,200 feet north of the intersection of State Highway 146 and State Route 586, along State Route 146, and 1,800 feet east; T. 2 N., R. 9 W.

Ap—0 to 10 inches; dark grayish brown (10YR 4/2) silt loam, light gray (10YR 7/2) dry; weak fine granular structure; friable; medium acid; abrupt smooth boundary.

Bg1—10 to 17 inches; gray (10YR 5/1) and grayish brown (10YR 5/2) silt loam; few fine faint brown (10YR 5/3) and prominent dark red (2.5YR 3/6) mottles; yellowish brown (10YR 5/6) streaks; weak medium prismatic structure parting to moderate medium platy; friable; many faint dark grayish brown (10YR 4/2) silt coatings on faces of peds; medium acid; gradual wavy boundary.

Bg2—17 to 24 inches; gray (10YR 5/1) silt loam; common medium dark red (2.5YR 3/6) mottles; moderate medium prismatic structure parting to moderate medium subangular blocky; friable; medium acid; clear wavy boundary.

Bg3—24 to 28 inches; dark gray (10YR 4/1) silty clay loam; common medium distinct dark yellowish brown (10YR 4/4) and yellowish brown (10YR 5/4) mottles; moderate medium prismatic structure; firm; medium acid; abrupt smooth boundary.

2Ab—28 to 35 inches; very dark gray (10YR 3/1) silty clay; common medium distinct yellowish brown (10YR 5/4) mottles; strong medium prismatic structure; firm; common faint dark gray (10YR 4/1) coatings on faces of peds; slightly acid; abrupt wavy boundary.

2Bgb1—35 to 48 inches; dark gray (10YR 4/1) silty clay loam; common medium faint gray (10YR 5/1) and distinct yellowish brown (10YR 5/4) mottles; moderate medium prismatic structure; firm; common faint very dark gray (10YR 3/1) coatings on faces of peds; medium acid; abrupt wavy boundary.

2Bgb2—48 to 80 inches; light brownish gray (10YR 6/2) silty clay loam; common medium distinct yellowish brown (10YR 5/4) mottles; few dark yellowish brown (10YR 3/4) stains; weak coarse prismatic structure; firm; common faint gray (10YR 5/1) coatings on vertical faces of peds; medium acid.

The thickness of the silty alluvium overlying the 2Ab horizon ranges from 15 to 36 inches. The content of gravel ranges from 0 to 2 percent, by volume, in the A and Bg horizons and from 0 to 10 percent in the 2Ab, 2Bgb, and 2Cg horizons.

The Ap and Bg horizons have value of 4 or 5 and chroma of 1 or 2. The 2Ab horizon has value of 2 or 3 and chroma of 1 or 2. It is silty clay loam or silty clay. The 2Bgb horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 1 or 2. It is dominantly silty clay loam, but it has layers of silt loam in some pedons.

Lakin Series

The Lakin series consists of deep, excessively drained soils on dunes at the eastern margin of former glacial lakes or outwash plains. These soils formed in eolian fine sand. They have an argillic horizon that consists of thin lamellae. Permeability is rapid. Slopes range from 8 to 25 percent.

Lakin soils are similar to Chavies and Watertown soils and are commonly adjacent to Alford and Glenford soils. Chavies and Watertown soils do not have bands in the B horizon. Alford soils are in landscape positions similar to those of the Lakin soils. They are not as sandy as the Lakin soils and have a higher content of clay and silt. Glenford soils are on nearby lacustrine terraces and are moderately well drained. They have a higher content of silt and clay than the Lakin soils.

Typical pedon of Lakin loamy fine sand, 8 to 15 percent slopes, about 1 mile east-southeast of Dresden, in Madison Township; 1,500 feet east of the intersection of State Route 666 and Copeland Road, and 200 feet south; T. 3 N., R. 7 W.

Ap—0 to 9 inches; brown (10YR 4/3) loamy fine sand, light gray (10YR 7/2) dry; moderate medium platy structure parting to weak very fine granular; friable; many fine roots; few medium distinct yellowish brown (10YR 5/4) inclusions of E material in the lower part; medium acid; abrupt smooth boundary.

E—9 to 24 inches; yellowish brown (10YR 5/4) loamy fine sand; moderate medium platy structure parting to weak fine subangular blocky; friable; common fine roots; medium acid; gradual wavy boundary.

E and Bt—24 to 55 inches; dominant bands of brown (10YR 5/3) loamy fine sand (E); massive; very friable; very strongly acid; lamellae of yellowish brown (10YR 5/6) loamy fine sand and fine sandy loam 0.25 inch to 3.5 inches thick (Bt); moderate medium subangular blocky structure; friable; few fine roots; clay bridges between sand grains in the Bt part; combined thickness of the lamellae is about 5 inches; very strongly acid; gradual wavy boundary.

C—55 to 87 inches; pale brown (10YR 6/3) fine sand; thin bands of yellowish brown (10YR 5/4) loamy fine sand; single grained; loose; very strongly acid.

The thickness of the solum ranges from 40 to 80 inches. Depth to the uppermost bands ranges from 10 to 26 inches.

The Ap horizon has hue of 10YR or 7.5YR and value and chroma of 3 or 4. The E horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. The Bt part of the E and Bt horizon consists of bands that range from 0.25 inch to 4.0 inches in thickness and that have a cumulative thickness of less than 5.5 inches. The bands have hue of 5YR, 7.5YR, or 10YR, value of 4 or 5, and chroma of 4 to 6. The C horizon has value of 5 or 6 and chroma of 3 or 4. It is loamy fine sand, fine sand, or sand.

Lindside Series

The Lindside series consists of deep, moderately well drained soils on flood plains. These soils formed in recent alluvial sediments. Permeability is moderate or moderately slow. Slopes range from 0 to 3 percent.

Lindside soils are similar to Lobdell and Nolin soils and are commonly adjacent to Chagrin, Newark, and Tioga soils. Lobdell soils have more sand and gravel in the subsoil than the Lindside soils. Nolin soils are well drained. Chagrin and Tioga soils are in landscape positions similar to those of the Lindside soils and are well drained. They have more sand in the subsoil than the Lindside soils. Newark soils are somewhat poorly drained and are on the lower, wetter parts of flood plains.

Typical pedon of Lindside silt loam, occasionally flooded, about 0.5 mile southwest of Frazeysburg, in Jackson Township; 100 feet north and 2,300 feet east of the southwest corner of sec. 19, T. 3 N., R. 9 W.

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; weak medium granular structure; friable; many fine and medium roots; medium acid; abrupt smooth boundary.

Bw1—9 to 18 inches; yellowish brown (10YR 5/4) silt loam; common medium faint brown (10YR 5/3) mottles; moderate fine subangular blocky structure; friable; many fine roots; dark grayish brown (10YR 4/2) krotovinas; many distinct dark grayish brown (10YR 4/2) organic coatings on vertical faces of peds; strongly acid; clear wavy boundary.

Bw2—18 to 30 inches; yellowish brown (10YR 5/4) silt loam; many medium distinct light brownish gray (2.5Y 6/2) mottles; moderate medium subangular blocky structure; friable; few roots; strongly acid; clear wavy boundary.

Bw3—30 to 40 inches; pale brown (10YR 6/3) silt loam; few fine distinct strong brown (7.5YR 5/6) and many coarse distinct light brownish gray (2.5Y 6/2) mottles; weak coarse subangular blocky structure; friable; medium acid; gradual wavy boundary.

C—40 to 60 inches; dark brown (7.5YR 4/4) silt loam; common medium prominent light brownish gray (2.5Y 6/2) mottles; massive; friable; medium acid.

The thickness of the solum ranges from 25 to 50 inches. The content of coarse fragments ranges from 0 to 5 percent within a depth of 40 inches and from 0 to 30 percent below that depth.

The Ap horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 2 or 3. Pedons in undisturbed areas have a thin A horizon. This horizon has hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 1 to 3. It is dominantly silt loam, but in some pedons it is silty clay loam or loam. The B horizon has hue of 7.5YR to 2.5Y and value of 4 or 5. It has chroma of 3 to 6 at a depth of less than 20 inches and of 1 to 4 at a depth of more than 40 inches. It is silt loam or silty clay loam. In some pedons it has thin strata of very fine sandy loam, fine sandy loam, loam, or clay loam. The C horizon generally has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 1 to 4, but it may have chroma of 6 to 8 if the colors are mixed. It is silty clay loam, silt loam, loam, clay loam, very fine sandy loam, fine sandy loam, or sandy loam. It is stratified in some pedons.

Lobdell Series

The Lobdell series consists of deep, moderately well drained soils on narrow flood plains along rapidly flowing streams and on alluvial fans. These soils formed in alluvial deposits. Permeability is moderate. Slopes are 0 to 3 percent.

Lobdell soils are similar to Chagrin and Lindside soils and are commonly adjacent to Newark and Melvin soils. Chagrin soils are well drained. Lindside soils have fewer coarse fragments in the solum and underlying material than the Lobdell soils. Newark and Melvin soils are in the lower areas on flood plains. Newark soils are somewhat poorly drained. Melvin soils are poorly drained.

Typical pedon of Lobdell loam, channery substratum, occasionally flooded, about 4 miles south-southwest of Norwich, in Salt Creek Township; 4,000 feet south of the intersection of Flat Lane and Sundale Road, and 200 feet west of Sundale Road; in sec. 1, T. 13 N., R. 12 W.

Ap—0 to 6 inches; brown (10YR 4/3) loam, pale brown (10YR 6/3) dry; weak fine subangular blocky structure; very friable; many fine roots; about 5 percent siltstone fragments; medium acid; clear wavy boundary.

Bw1—6 to 14 inches; dark yellowish brown (10YR 4/4) silt loam; weak fine subangular blocky structure; friable; many fine roots; about 5 percent siltstone fragments; medium acid; clear wavy boundary.

Bw2—14 to 28 inches; brown (10YR 4/3) channery silt loam; common fine distinct strong brown (7.5YR 5/6) and common medium faint dark grayish brown (10YR 4/2) mottles; weak medium subangular blocky structure; friable; common fine roots; about 20 percent siltstone fragments; many black (10YR 2/1) concretions and stains of iron and manganese oxide; medium acid; clear wavy boundary.

C1—28 to 42 inches; grayish brown (10YR 5/2) channery loam; common medium faint brown (10YR 5/3) and many medium distinct yellowish brown (10YR 5/6) mottles; massive; friable; common fine roots; about 15 percent siltstone fragments; slightly acid; clear wavy boundary.

C2—42 to 58 inches; dark brown (7.5YR 4/4) channery loam; common medium distinct dark grayish brown (10YR 4/2) mottles; massive; firm; few fine roots; common fine black (10YR 2/1) stains of iron and manganese oxide; about 15 percent siltstone fragments; slightly acid; gradual wavy boundary.

C3—58 to 63 inches; dark brown (7.5YR 4/4) channery loam; common medium distinct (10YR 5/2) mottles; massive; firm; few fine roots; common fine black (10YR 2/1) stains of iron and manganese oxide; about 35 percent siltstone fragments; neutral.

The thickness of the solum ranges from 24 to 50 inches. The content of coarse fragments ranges from 0 to 5 percent in the A horizon, from 0 to 15 percent in the upper part of the Bw horizon, from 0 to 25 percent in the lower part of the Bw horizon, and from 10 to 35 percent in the C horizon.

The Ap horizon has value of 3 or 4 and chroma of 2 or 3. Some pedons have an A horizon. The A or Ap horizon is loam, silt loam, sandy loam, or the channery analogs of those textures. The Bw horizon has hue of 7.5YR, 10YR, or 2.5Y, value of 4 or 5, and chroma of 3 or 4. It is loam, silt loam, sandy loam, or the gravelly or channery analogs of those textures. The C horizon has hue of 7.5YR, 10YR, or 2.5Y, value of 4 to 6, and chroma of 1 to 8. It is the channery or gravelly analogs of loam, silt loam, or sandy loam.

Lorain Series

The Lorain series consists of deep, very poorly drained, slowly permeable soils that are in former glacial lake valleys. These soils formed in clayey lacustrine deposits. They are in level or depressed areas that have no natural drainage outlets. Slopes range from 0 to 2 percent.

Lorain soils are commonly adjacent to Luray, McGary, and Sebring soils. Luray and Sebring soils are in landscape positions similar to those of the Lorain soils. They have less clay in the surface layer and subsoil than the Lorain soils. McGary soils are somewhat poorly drained and are in the more convex landscape positions.

Typical pedon of Lorain silty clay, about 1.5 miles north of Nashport, in Licking Township; 900 feet north of the intersection of State Route 586 and O'Bannon Road and 1,900 feet west of State Route 586; T. 2 N., R. 9 W.

Ap—0 to 7 inches; very dark gray (10YR 3/1) silty clay, gray (10YR 5/1) dry; moderate medium granular structure; friable; many coarse to fine roots; neutral; clear wavy boundary.

Btg1—7 to 12 inches; dark gray (N 4/0) silty clay, light gray (10YR 6/1) dry; common fine distinct yellowish brown (10YR 5/4) mottles; moderate fine prismatic structure parting to moderate fine angular blocky; friable; common fine roots; few faint clay films on faces of peds; slightly acid; clear smooth boundary.

Btg2—12 to 25 inches; gray (N 5/0) silty clay; many medium distinct yellowish brown (10YR 5/4) mottles; moderate medium prismatic structure parting to moderate medium angular blocky; firm; common fine roots; krotovinas, 1 inch in diameter, filled with very dark gray (10YR 3/1) silty clay; few faint clay films on faces of peds; neutral; gradual smooth boundary.

Btg3—25 to 48 inches; gray (5Y 5/1) silty clay; moderate coarse prismatic structure; firm; few fine roots; gray (N 5/0) coatings on faces of peds; few faint clay films on faces of peds; neutral; gradual smooth boundary.

BCg—48 to 60 inches; dark grayish brown (10YR 4/2) clay; common medium distinct dark yellowish brown (10YR 4/4) mottles; weak very coarse prismatic structure with laminations; very firm; gray (N 5/0) coatings on faces of peds; common medium distinct light gray (10YR 7/2) streaks of secondary calcium carbonate; about 5 percent fine gravel; slight effervescence; mildly alkaline.

The thickness of the solum ranges from 40 to 60 inches. No coarse fragments are within a depth of 40 inches. The content of coarse fragments ranges from 0 to 5 percent at a depth of more than 40 inches.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. It is mainly silty clay but is silty clay loam in some pedons. The Btg horizon has hue of 10YR, 2.5Y, or 5Y or is neutral in hue. It has value of 4 or 5 and chroma of 0 to 2. It is silty clay or clay. Some pedons have a Cg horizon.

Lowell Series

The Lowell series consists of deep, well drained soils on ridgetops, hillsides, and benches. These soils formed in material weathered from interbedded shale, siltstone, and limestone. Permeability is moderately slow. Slopes range from 8 to 70 percent.

Lowell soils are similar to Aaron, Brookside, and Guernsey soils and are commonly adjacent to Gilpin and Upshur soils. Aaron and Guernsey soils are moderately well drained. Brookside soils are moderately well drained. They have a higher content of coarse fragments throughout than the Lowell soils. Upshur soils are in landscape positions similar to those of the Lowell soils. They have a reddish subsoil. Gilpin soils are on the steeper parts of hillsides. They are moderately deep over siltstone bedrock.

Typical pedon of Lowell silt loam, 15 to 25 percent slopes, eroded, about 1.5 miles north of High Hill, in Rich Hill Township; 1,000 feet east of Freeland Road, 2,100 feet east and 1,700 feet north of the southwest corner of sec. 33, T. 13 N., R. 11 W.

Ap—0 to 8 inches; brown (10YR 4/3) silt loam, light gray (10YR 7/2) dry; weak medium granular structure; friable; many fine roots; about 2 percent coarse fragments; slightly acid; abrupt smooth boundary.

BE—8 to 18 inches; dark brown (7.5YR 4/4) silty clay loam; moderate medium subangular blocky structure; friable; common fine roots; thin continuous dark brown (7.5YR 4/4) silt coatings on faces of peds; strongly acid; clear smooth boundary.

Bt1—18 to 27 inches; strong brown (7.5YR 5/6) silty clay; moderate medium prismatic structure parting to moderate medium subangular blocky; very firm; common fine roots; thin patchy brown (10YR 5/3) clay films on faces of peds; common very dark brown (10YR 2/2) concretions of iron and manganese oxide; strongly acid; gradual wavy boundary.

Bt2—27 to 36 inches; strong brown (7.5YR 5/6) clay; few fine distinct brown (10YR 5/3) mottles; weak coarse prismatic structure parting to moderate coarse subangular blocky; very firm; thin continuous brown (10YR 5/3) clay films on faces of peds; few very dark brown (10YR 2/2) concretions of iron and manganese oxide; medium acid; gradual wavy boundary.

Bt3—36 to 41 inches; yellowish brown (10YR 5/6) clay; common medium distinct grayish brown (10YR 5/2) mottles; weak coarse prismatic structure; very firm; thin continuous brown (10YR 5/3) clay films on faces of peds; common very dark brown (10YR 2/2) concretions of iron and manganese oxide; medium acid; abrupt wavy boundary.

BC—41 to 57 inches; brown (10YR 5/3) silty clay loam; common fine distinct yellowish brown (10YR 5/6) mottles; moderate coarse subangular blocky structure; firm; few fine dark yellowish brown (10YR 4/4) coatings on faces of peds; common slickensides; common distinct light gray (10YR 7/2) coatings of carbonate; about 5 percent coarse fragments; violent effervescence; mildly alkaline; clear wavy boundary.

C—57 to 70 inches; brown (10YR 5/3) channery silty clay loam; massive; firm; about 25 percent coarse fragments; slight effervescence; mildly alkaline; clear wavy boundary.

Cr—70 to 80 inches; brown (10YR 5/3), soft clay shale bedrock; common distinct light gray (10YR 7/2) coatings of carbonate.

The thickness of the solum ranges from 30 to 60 inches. The depth to bedrock ranges from 40 to 80 inches. The content of coarse fragments ranges from 0 to 5 percent in the upper part of the solum, from 0 to 15 percent in the lower part of the solum, and from 1 to 50 percent in the C horizon.

The Ap horizon has value of 4 or 5 and chroma of 2 to 4. Some pedons have a thin A horizon. Other pedons have coatings on peds that have value of 3. The Bt horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6. It is silty clay loam, silty clay, or clay. The C horizon has hue of 2.5Y to 7.5YR, value of 3 to 6, and chroma of 4 to 6. It is silty clay loam, silty clay, or clay.

Luray Series

The Luray series consists of deep, very poorly drained soils in former glacial lake valleys. These soils are in level or depressed areas in the lowest positions on the landscape. They formed in silty, stratified lacustrine sediments. Permeability is moderately slow. Slopes range from 0 to 2 percent.

Luray soils are commonly adjacent to Fitchville, Killbuck, Lorain, and Sebring soils. Lorain soils are in landscape positions similar to those of the Luray soils. They have a thinner dark surface layer than the Luray soils and are more clayey in the surface layer and subsoil. Fitchville and Sebring soils have a lighter colored surface layer than the Luray soils. The poorly drained Sebring soils are in landscape positions similar to those of the Luray soils. The somewhat poorly drained Fitchville soils are in the higher landscape positions. Killbuck soils are occasionally flooded. They have silty sediments over dark lacustrine deposits.

Typical pedon of Luray silty clay loam, about 0.5 mile south of Shannon, in Muskingum Township; 2,400 feet southwest of the intersection of Shannon Road and Shannon Valley Road, and 600 feet southeast; in sec. 5, T. 2 N., R. 8 W.

Ap—0 to 10 inches; very dark gray (10YR 3/1) silty clay loam, gray (10YR 5/1) dry; weak medium granular structure; firm; many fine roots; neutral; clear smooth boundary.

AB—10 to 16 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; moderate fine angular blocky structure; firm; common fine roots; slightly acid; clear wavy boundary.

Btg1—16 to 34 inches; dark gray (10YR 4/1) silty clay loam; common medium distinct light olive gray (2.5Y 5/2) mottles; weak medium prismatic structure parting to weak fine subangular blocky; firm; few fine roots; many faint gray (10YR 5/1) clay films on vertical faces of peds; neutral; gradual wavy boundary.

Btg2—34 to 48 inches; gray (N 5/0) silty clay loam; common fine distinct light olive gray (2.5Y 5/2) and few fine prominent yellowish brown (10YR 5/4) mottles; weak coarse prismatic structure parting to weak medium subangular blocky; firm; many faint dark gray (N 4/0) clay films on vertical faces of peds; neutral; gradual wavy boundary.

BCg—48 to 55 inches; light olive gray (2.5Y 5/2) silty clay loam; common medium distinct yellowish brown (10YR 5/4) mottles; weak coarse prismatic structure; firm; common distinct dark gray (N 4/0) clay films on vertical faces of peds; neutral; gradual wavy boundary.

C—55 to 60 inches; grayish brown (2.5Y 5/2) silt loam; many medium distinct yellowish brown (10YR 5/4) mottles; massive; firm; common coarse black (10YR 2/1) crawfish krotovinas; mildly alkaline.

The thickness of the solum ranges from 30 to 60 inches. The mollic epipedon is 10 to 18 inches thick. It extends into the Btg horizon in some pedons. No coarse fragments are in the solum. The content of coarse fragments ranges from 0 to 2 percent in the C horizon.

The A horizon has value of 2 or 3 and chroma of 1 or 2. It is silt loam or silty clay loam. The Btg horizon has hue of 10YR, 2.5Y, or 5Y or is neutral in hue. It has value of 3 to 6 and chroma of 0 to 2. It is silty clay loam or silt loam. The C horizon has hue of 10YR, 2.5Y, or 5Y or is neutral in hue. It has value of 4 to 6 and chroma of 0 to 8 and is mottled. It is mainly silt loam or silty clay loam but commonly has thin strata of loam, fine sandy loam, or sandy loam. In some pedons it has free carbonates.

Markland Series

The Markland series consists of deep, moderately well drained and well drained soils on glacial lake terraces in filled valleys. These soils formed in lacustrine sediments. Permeability is slow. Slopes range from 2 to 35 percent.

Markland soils are commonly adjacent to McGary, Rawson, Glenford, and Watertown soils. Glenford soils are in landscape positions similar to those of the Markland soils. They have more silt and less clay throughout than the Markland soils. The somewhat poorly drained McGary soils are on flats. Rawson soils are near the edges of former glacial lakes. They have more sand in the upper part than the Markland soils. The well drained Watertown soils are on the dissected parts of terraces. They have much less clay than the Markland soils.

Typical pedon of Markland silt loam, 2 to 6 percent slopes, about 0.5 mile south of Avondale, in Newton Township; 1,200 feet north and 1,800 feet west of the southeast corner of sec. 15, T. 15 N., R. 14 W.

Ap—0 to 7 inches; brown (10YR 4/3) silt loam, very pale brown (10YR 8/3) dry; moderate fine granular structure; friable; many fine roots; medium acid; abrupt smooth boundary.

Bt1—7 to 13 inches; yellowish brown (10YR 5/4) silty clay loam; moderate medium prismatic structure parting to moderate medium angular blocky; firm; common fine roots; many faint brown (10YR 5/3) clay films on faces of peds; strongly acid; clear smooth boundary.

Bt2—13 to 21 inches; yellowish brown (10YR 5/4) silty clay; moderate medium prismatic structure parting to moderate medium angular blocky; firm; common fine roots; many faint brown (10YR 5/3) clay films on faces of peds; strongly acid; clear smooth boundary.

Bt3—21 to 28 inches; yellowish brown (10YR 5/4) silty clay; common fine distinct grayish brown (2.5Y 5/2) mottles; moderate coarse prismatic structure; firm; few fine roots; many distinct grayish brown (10YR 5/2) clay films on faces of peds; common black (10YR 2/1) stains of iron and manganese oxide; strongly acid; gradual smooth boundary.

BC—28 to 36 inches; yellowish brown (10YR 5/4) silty clay loam; few fine distinct grayish brown (10YR 5/2) mottles; moderate very coarse prismatic structure; firm; few fine roots; common distinct dark grayish brown (10YR 4/2) clay films on faces of peds; mildly alkaline; abrupt smooth boundary.

C1—36 to 48 inches; yellowish brown (10YR 5/4) silty clay loam; common fine distinct grayish brown (10YR 5/2) mottles; massive; laminated; firm; common light gray (10YR 7/2) nodules and streaks and a secondary accumulation of calcium carbonate; slight effervescence; mildly alkaline; gradual smooth boundary.

C2—48 to 80 inches; yellowish brown (10YR 5/4) silty clay loam; common fine distinct gray (10YR 5/1) mottles; massive; laminated; slight effervescence; mildly alkaline.

The thickness of the solum and the depth to free carbonates range from 20 to 40 inches.

The Ap horizon has value of 4 or 5 and chroma of 2 to 4. Some pedons have an A horizon. This horizon has value of 3 or 4 and chroma of 1 to 3. The A or Ap horizon is silt loam or silty clay loam. The Bt horizon has hue of 2.5Y, 10YR, or 7.5YR, value of 4 or 5, and chroma of 3 to 6. In most pedons it has mottles in the lower part. It is commonly silty clay or clay, but in some pedons the upper part is silty clay loam. The content of clay is 40 to 55 percent in the Bt horizon. The C horizon has hue of 2.5Y or 10YR, value of 4 to 6, and chroma of 2 to 4. It is clay, silty clay, or silty clay loam and has thin strata of silt, silt loam, or very fine sand.

McGary Series

The McGary series consists of deep, somewhat poorly drained soils on glacial lake terraces in filled valleys. These soils formed in deposits of calcareous lacustrine clay and silt. Permeability is slow or very slow. Slopes range from 0 to 3 percent.

McGary soils are commonly adjacent to Lorain, Markland, and Fitchville soils. Fitchville soils are in landscape positions similar to those of the McGary soils. They have less clay and more silt in the subsoil than the McGary soils. Markland soils are moderately well drained and well drained. They are more sloping than the McGary soils. The very poorly drained Lorain soils are in nearby depressions.

Typical pedon of McGary silt loam, 0 to 3 percent slopes, about 1.5 miles northeast of Frazeysburg, in Jackson Township; about 2,250 feet north of the intersection of State Route 16 and Old Riley Road, and 350 feet east; T. 3 N., R. 9 W.

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) silt loam, light gray (10YR 7/2) dry; moderate medium granular structure; friable; many medium and fine roots; slightly acid; abrupt smooth boundary.

Bt1—6 to 14 inches; yellowish brown (10YR 5/4) silty clay loam; many medium faint yellowish brown (10YR 5/6) and many fine distinct gray (10YR 5/1) mottles; moderate medium prismatic structure parting to moderate medium angular blocky; firm; common fine roots; many distinct light brownish gray (2.5Y 6/2) clay films and silt coatings on faces of peds; medium acid; clear smooth boundary.

Bt2—14 to 26 inches; yellowish brown (10YR 5/4) silty clay; many medium distinct gray (10YR 5/1) mottles; moderate coarse prismatic structure parting to moderate medium angular blocky; firm; common black (10YR 2/1) stains of iron and manganese oxide; many distinct light brownish gray (10YR 6/2) clay films on faces of peds; few fine roots; medium acid; gradual smooth boundary.

Bt3—26 to 40 inches; brown (10YR 4/3) silty clay; many medium distinct gray (10YR 5/1) mottles; moderate very coarse prismatic structure parting to moderate coarse angular blocky; firm; common black (10YR 2/1) stains of iron and manganese oxide; many faint dark grayish brown (10YR 4/2) coatings and films on vertical faces of peds; few fine roots; neutral; clear smooth boundary.

C—40 to 60 inches; brown (10YR 4/3) silty clay loam; common medium distinct yellowish brown (10YR 5/4) and dark gray (10YR 4/1) mottles; massive with weak bedding planes; very firm; many distinct gray (N 5/0) coatings on vertical faces of widely spaced cracks; common distinct very pale brown (10YR 7/3) streaks and few nodules of secondary calcium carbonate; strong effervescence; mildly alkaline.

The thickness of the solum ranges from 24 to 40 inches. The depth to carbonates ranges from 20 to 55 inches.

The Ap horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 to 3. It is silt loam or silty clay loam. The Bt horizon commonly has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 to 4. The matrix is mottled with colors that have chroma of 1 to 6. The Bt horizon is silty clay loam or silty clay. Coatings on the faces of peds include clay, silt, and organic stains. They have chroma of 1 or 2. The C horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 to 3. It is mottled. It is commonly stratified clay, silty clay loam, and silty clay, but in some pedons it has thin layers of silt or silt loam.

Melvin Series

The Melvin series consists of deep, poorly drained soils that formed in recent alluvial sediments on flood plains. Permeability is moderate. Slopes range from 0 to 2 percent.

Melvin soils are similar to Killbuck soils and are commonly adjacent to Lindside, Newark, Sebring, and Nolin soils. Killbuck soils have a very dark buried layer that is at least 6 inches thick at a depth of 15 to 36 inches. The somewhat poorly drained Newark soils are in landscape positions similar to those of the Melvin soils. Sebring soils formed in lake sediments on former glacial lake terraces. Flooding is unlikely in areas of the Sebring soils. Lindside and Nolin soils are better drained than the Melvin soils. They are in nearby areas on the higher parts of flood plains.

Typical pedon of Melvin silt loam, frequently flooded, about 4 miles southeast of Frazeysburg, in Muskingum Township; about 330 feet north and 925 feet west of the center of sec. 7, T. 2 N., R. 8 W.

A—0 to 3 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; weak medium granular structure; friable; many fine and medium roots; neutral; clear smooth boundary.

Cg—3 to 24 inches; gray (10YR 5/1) silt loam; common medium prominent yellowish red (5YR 5/6) mottles; moderate fine subangular blocky structure; friable; common fine and medium roots; slightly acid; abrupt smooth boundary.

Ab—24 to 27 inches; very dark gray (10YR 3/1) silt loam; common medium distinct grayish brown (10YR 5/2) mottles; moderate medium subangular blocky structure; friable; few fine and medium roots; slightly acid; abrupt smooth boundary.

C′g1—27 to 38 inches; light brownish gray (2.5Y 6/2) silt loam; many coarse faint light olive brown (2.5Y 5/4) mottles; moderate medium prismatic structure; friable; neutral; clear wavy boundary.

C′g2—38 to 44 inches; gray (N 6/0) silt loam; many medium prominent yellowish brown (10YR 5/4) mottles; weak coarse subangular blocky structure; friable; neutral; gradual wavy boundary.

C′g3—44 to 60 inches; gray (N 6/0) loam; many medium prominent yellowish brown (10YR 5/4) mottles; weak coarse subangular blocky structure; friable; few fine black (10YR 2/1) concretions of iron and manganese oxide; neutral.

The content of coarse fragments, mostly rounded pebbles, ranges from 0 to 5 percent to a depth of 30 inches. Below a depth of 30 inches, the content of coarse fragments ranges from 0 to 20 percent, by volume, in individual subhorizons.

The A horizon has hue of 10YR or 2.5Y and chroma of 1 or 2. It is commonly silt loam but is loam, fine sandy loam, or silty clay loam in some pedons. The Cg horizon has hue of 10YR, 2.5Y, or 5Y or is neutral in hue. It has value of 4 to 7 and chroma of 0 to 2. It is silt loam or silty clay loam. Some pedons do not have an Ab horizon. In some pedons the C′g horizon has strata of sandy loam, loam, loamy sand, clay loam, or silty clay loam at a depth of more than 40 inches. In some pedons, thin layers within the Cg horizon have matrix colors with high chroma.

Mertz Series

The Mertz series consists of deep, well drained, moderately slowly permeable soils on ridgetops and hillsides. These soils formed in siltstone colluvium that has a large amount of flint and chert fragments. Slopes range from 3 to 35 percent.

Mertz soils are similar to Berks soils and are commonly adjacent to Frankstown Variant, Coshocton, and Gilpin soils. Berks soils are moderately deep and contain mostly siltstone fragments. Frankstown Variant soils are in landscape positions similar to those of the Mertz soils. They are moderately deep over flint bedrock and have fewer coarse fragments in the subsoil than the Mertz soils. Coshocton soils are on the lower concave slopes. They have a lower content of coarse fragments than the Mertz soils and are moderately well drained. Gilpin soils are on ridgetops. They are moderately deep over siltstone.

Typical pedon of Mertz very cherty silt loam, 15 to 35 percent slopes, about 3.5 miles north-northeast of Gratiot, in Hopewell Township; about 300 feet south and 200 feet west of the center of sec. 6, T. 1 N., R. 9 W.

Oe—1 inch to 0; very dark brown (10YR 2/2) litter of decomposed oak, maple, hickory, and dogwood leaves; very many fine roots.

A—0 to 3 inches; black (10YR 2/1) very cherty silt loam, gray (10YR 5/1) dry; strong very fine granular structure; very friable; many fine roots; about 50 percent flint fragments; strongly acid; clear wavy boundary.

E—3 to 7 inches; dark grayish brown (10YR 4/2) very cherty silt loam; moderate thin platy structure parting to moderate medium subangular blocky; friable; many fine roots; about 50 percent angular flint fragments; strongly acid; clear wavy boundary.

BE—7 to 13 inches; yellowish brown (10YR 5/6) very cherty silt loam; common medium faint yellowish brown (10YR 5/8) mottles; moderate medium and fine subangular blocky structure; dark grayish brown (10YR 4/2) silt coatings on faces of peds; friable; many fine roots; about 60 percent angular flint fragments; strongly acid; clear wavy boundary.

Bt1—13 to 20 inches; yellowish brown (10YR 5/4) very cherty silty clay loam; moderate medium subangular blocky structure; firm; common faint dark yellowish brown (10YR 4/4) clay films; about 50 percent angular flint fragments; common fine roots; strongly acid; gradual wavy boundary.

Bt2—20 to 30 inches; strong brown (7.5YR 5/6) cherty silty clay loam; moderate coarse subangular blocky structure; very firm; many distinct dark yellowish brown (10YR 4/4) clay films; few fine roots; about 30 percent flint fragments; very strongly acid; clear wavy boundary.

2Bt3—30 to 36 inches; strong brown (7.5YR 5/6) channery silty clay loam; moderate medium prismatic structure; very firm; few fine roots; many faint brown (7.5YR 5/4) clay films; about 20 percent siltstone and flint fragments; strongly acid; gradual wavy boundary.

2Bt4—36 to 48 inches; strong brown (7.5YR 5/6) channery silty clay loam; moderate coarse prismatic structure; firm; common fine distinct light olive brown (2.5Y 5/4), weathered siltstone fragments; common black (N 2/0) stains of iron and manganese oxide; 20 percent siltstone fragments; strongly acid; gradual wavy boundary.

BC—48 to 60 inches; strong brown (7.5YR 5/6) channery silty clay loam; massive; many fine distinct light olive brown (2.5Y 5/4), weathered siltstone fragments; about 25 percent siltstone fragments; very strongly acid.

The thickness of the solum ranges from 40 to 65 inches. The content of coarse fragments of flint, chert, and siltstone ranges from 35 to 60 percent in individual horizons in the upper part of the solum and from 15 to 50 percent in the lower part.

The A horizon has value of 2 to 4 and chroma of 1 to 3. Some pedons do not have O and E horizons. The texture of the surface layer is cherty silt loam or very cherty silt loam. The Bt horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 8. It is the cherty, very cherty, channery, or very channery analogs of silty clay loam.

Morristown Series

The Morristown series consists of deep, well drained soils that formed in fine earth material excavated during mining for coal and limestone. These soils contain free lime and have a high content of coarse fragments. Permeability is moderately slow. Slopes range from 1 to 70 percent.

Morristown soils are similar to Fairpoint soils and are commonly adjacent to Bethesda, Gilpin, Lowell, and Upshur soils. Fairpoint soils are in areas of noncalcareous mine spoil. Bethesda soils are in areas of acid mine spoil that have not been reclaimed. Gilpin, Lowell, and Upshur soils are on nearby ridgetops and hillsides that have not been disturbed by mining.

Typical pedon of Morristown silty clay loam, 1 to 8 percent slopes, about 1.5 miles north of High Hill, in Rich Hill Township; about 300 feet west and 1,600 feet north of the southeast corner of sec. 33, T. 13 N., R. 11 W.

Ap—0 to 8 inches; dark brown (7.5YR 4/4) silty clay loam, pinkish gray (7.5YR 6/2) dry; moderate medium angular blocky structure parting to moderate coarse granular; firm; many medium and fine roots; about 10 percent coarse fragments of shale, siltstone, and limy shale, including 2 percent that are more than 3 inches in length; slight effervescence; mildly alkaline; abrupt wavy boundary.

C1—8 to 13 inches; light gray (5Y 6/1) channery silty clay loam; weak medium angular blocky structure; very firm; continuous gray (5Y 5/1) coatings on faces of peds; 10 to 15 percent coarse fragments, including 5 percent that are more than 3 inches in length; strong effervescence; moderately alkaline; clear wavy boundary.

C2—13 to 20 inches; light gray (5Y 6/1) very channery silty clay loam; massive; extremely firm; few fine roots; about 40 percent coarse fragments, including 10 percent that are more than 3 inches in length; strong effervescence; moderately alkaline; gradual wavy boundary.

C3—20 to 60 inches; light gray (5Y 6/1) very channery silt loam; massive; very firm; about 50 percent coarse fragments, including 20 percent that are more than 3 inches in length; strong effervescence; moderately alkaline.

The depth to bedrock is more than 60 inches. The content of coarse fragments in the control section ranges from 35 to 70 percent and averages about 40 percent. The coarse fragments range in size from fine gravel to stones and boulders.

The A horizon is gravelly, channery, or shaly in unreclaimed areas. In reclaimed areas it is natural soil material that is 4 to 12 inches thick. The A or Ap horizon is silty clay loam, silt loam, or loam. It has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 1 to 8. The C horizon is the very gravelly, extremely gravelly, very cobbly, extremely cobbly, very channery, or extremely channery analogs of loam, silt loam, clay loam, or silty clay loam. It has hue of 5YR to 5Y or is neutral in hue. It has value of 2 to 6 and chroma of 0 to 8.

Newark Series

The Newark series consists of deep, somewhat poorly drained soils on flood plains. These soils formed in recent alluvial sediments. Permeability is moderate. Slopes range from 0 to 3 percent.

Newark soils are commonly adjacent to Killbuck, Lindside, Melvin, Fitchville, and Lobdell soils. Melvin soils are poorly drained and are in the lower areas on flood plains. Killbuck soils are poorly drained and are on alluvial fans. Fitchville soils are in areas of lake sediments that are not flooded. They have an argillic horizon. The moderately well drained Lobdell and Lindside soils are in the higher areas on flood plains.

Typical pedon of Newark silt loam, frequently flooded, about 2.5 miles south of Fultonham, in Newton Township; 1,670 feet west and 1,910 feet north of the southeast corner of sec. 36, T. 11 N., R. 15 W.

Ap—0 to 11 inches; dark grayish brown (10YR 4/2) silt loam, pale brown (10YR 6/3) dry; weak fine granular structure; very friable; many fine roots; slightly acid; abrupt smooth boundary.

Bw—11 to 19 inches; brown (10YR 4/3) silt loam; common medium distinct grayish brown (10YR 5/2) mottles; weak fine and medium subangular blocky structure; very friable; common fine roots; few faint brown (10YR 4/3) silt coatings on faces of peds; slightly acid; clear wavy boundary.

Bg—19 to 32 inches; grayish brown (10YR 5/2) silt loam; many medium distinct brown (10YR 4/3) and dark yellowish brown (10YR 4/4) mottles; weak medium and coarse subangular blocky structure; very friable; many medium prominent black (N 2/0) and reddish brown (5YR 4/3) stains of iron and manganese oxide; medium acid; gradual smooth boundary.

C1—32 to 45 inches; dark yellowish brown (10YR 4/4) silt loam; many medium distinct grayish brown (2.5Y 5/2) mottles; massive; friable; common medium prominent black (N 2/0) and reddish brown (5YR 4/3) stains of iron and manganese oxide; medium acid; diffuse boundary.

C2—45 to 60 inches; light brownish gray (2.5Y 6/2) silt loam; many medium distinct dark yellowish brown (10YR 4/4) mottles; massive; friable; medium acid.

The thickness of the solum ranges from 22 to 44 inches. The content of coarse fragments, which are mostly gravel, ranges from 0 to 5 percent within a depth of 30 inches. It is as much as 15 percent at a depth of 30 to 40 inches and 60 percent at a depth of more than 40 inches.

The Ap horizon has hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 2 to 4. It is mottled in some pedons. The B horizon has hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 2 to 4. It is silt loam or silty clay loam. The C horizon has matrix colors similar to those of the B horizon. It is silt loam or silty clay loam. In some pedons it has thin layers of loam, fine sandy loam, silty clay, or the gravelly analogs of those textures.

Nolin Series

The Nolin series consists of deep, well drained, moderately permeable soils on the flood plains along the Muskingum River and its tributaries. These soils formed in alluvial sediments. They are occasionally flooded. Slopes range from 0 to 3 percent.

The Nolin soils in Muskingum County have less color and structure development in the subsoil than is typical for the series. This difference, however, does not affect use and management of the soils.

Nolin soils are similar to Lindside soils and are commonly adjacent to Chagrin, Melvin, Tioga, and Chavies soils. Lindside soils are moderately well drained. Chagrin and Tioga soils are in landscape positions similar to those of the Nolin soils. Chagrin soils have more sand and less silt in the subsoil than the Nolin soils. Tioga soils have more sand and less clay in the subsoil than the Nolin soils. Melvin soils are poorly drained and are in low areas on the flood plains. Chavies soils are on outwash terraces and are not subject to flooding.

Typical pedon of Nolin silt loam, occasionally flooded, about 0.5 mile northeast of Dresden, in Cass Township; about 3,450 feet east of the intersection of North Dresden Road and Gene Cox Memorial Drive, and about 530 feet south; T. 3 N., R. 8 W.

Ap—0 to 7 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; moderate medium granular structure; friable; many fine and medium roots; thin continuous dark grayish brown (10YR 4/2) organic coatings on vertical faces of peds; common fine dark gray (10YR 4/1) wormcasts; neutral; clear smooth boundary.

C1—7 to 14 inches; brown (10YR 4/3) silt loam; weak fine granular structure; firm; common fine roots; many faint dark grayish brown (10YR 4/2) organic coatings on faces of peds; common fine distinct dark gray (10YR 4/1) wormcasts; neutral; clear smooth boundary.

C2—14 to 26 inches; brown (10YR 4/3) silt loam; common fine faint dark yellowish brown (10YR 4/4) mottles; weak medium subangular blocky structure parting to moderate medium granular; friable; few fine roots; many faint dark grayish brown (10YR 4/2) organic coatings on faces of peds; neutral; gradual smooth boundary.

C3—26 to 40 inches; brown (10YR 4/3) silt loam; common fine faint dark yellowish brown (10YR 4/4) mottles; weak medium platy structure parting to moderate medium granular; very friable; many faint dark grayish brown (10YR 4/2) organic coatings on faces of peds; neutral; gradual smooth boundary.

C4—40 to 50 inches; brown (10YR 4/3) silt loam; few fine faint dark yellowish brown (10YR 4/4) mottles; weak medium platy structure parting to weak coarse granular; friable; few faint dark grayish brown (10YR 4/2) organic coatings on faces of peds; neutral; clear smooth boundary.

C5—50 to 60 inches; dark yellowish brown (10YR 4/4) silt loam; few coarse prominent grayish brown (10YR 5/2) and common medium prominent yellowish brown (10YR 5/8) mottles; weak coarse granular structure; friable; neutral.

The thickness of the alluvial deposits ranges from 40 inches to many feet. The content of coarse fragments, mostly pebbles, ranges from 0 to about 5 percent in the solum.

The Ap horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 or 3. It is generally silt loam, but in some pedons it is loam. The C horizon has hue of 7.5YR, 10YR, or 2.5Y, value of 4 or 5, and chroma of 3 or 4. In some pedons it has mottles with chroma of 2 or less at a depth of more than 24 inches. It is silt loam or silty clay loam. Thin strata of loam, fine sandy loam, sandy loam, or the gravelly analogs of those textures are at a depth of more than 40 inches.

Omulga Series

The Omulga series consists of deep, moderately well drained soils on terraces composed of valley fill. These soils formed in loess, colluvium, or old alluvium underlain by lacustrine sediments. They have a fragipan. Permeability is moderate above the fragipan and slow in the fragipan. Slopes range from 2 to 15 percent and are mainly concave.

Omulga soils are similar to Clarksburg and Zanesville soils and are commonly adjacent to Coshocton, Glenford, and Rawson soils. Clarksburg soils have coarse fragments. Coshocton, Glenford, and Rawson soils do not have a fragipan. Zanesville soils have material weathered from sandstone and siltstone in the lower part of the solum. Glenford and Rawson soils are on landforms similar to those of the Omulga soils but are usually at the lower elevations. Zanesville and Coshocton soils are on ridgetops and hillsides above the Omulga soils.

Typical pedon of Omulga silt loam, 2 to 6 percent slopes, about 0.7 mile southwest of Norwich, in Union Township; 800 feet west and 880 feet south of the northeast corner of sec. 15, T. 1 N., R. 5 W.

Ap—0 to 8 inches; brown (10YR 4/3) silt loam, light gray (10YR 7/2) dry; weak fine granular structure; friable; dark brown (10YR 3/3) stains of iron and manganese oxide; strongly acid; abrupt smooth boundary.

Bt1—8 to 13 inches; yellowish brown (10YR 5/4) silt loam; weak fine subangular blocky structure; firm; common faint brown (10YR 5/3) silt coatings; few faint dark yellowish brown (10YR 4/4) clay films; strongly acid; clear smooth boundary.

Bt2—13 to 21 inches; yellowish brown (10YR 5/4) silt loam; few fine faint yellowish brown (10YR 5/6) and pale brown (10YR 6/3) mottles; moderate fine and medium subangular blocky structure; firm; common fine very dark grayish brown (10YR 3/2) stains of iron and manganese oxide; common faint dark yellowish brown (10YR 4/4) clay films; very strongly acid; clear wavy boundary.

Bt3—21 to 24 inches; brown (10YR 4/3) silt loam; few medium distinct yellowish brown (10YR 5/6) and grayish brown (10YR 5/2) mottles; moderate medium angular blocky structure; firm; many faint dark grayish brown (10YR 4/2) clay films on faces of peds; strongly acid; clear wavy boundary.

Btx1—24 to 30 inches; yellowish brown (10YR 5/4) silt loam; common medium distinct yellowish brown (10YR 5/8) and gray (10YR 5/1) mottles; moderate very coarse prismatic structure parting to weak coarse subangular blocky; brittle and very firm; black (N 2/0) stains of iron and manganese oxide; very distinct dark grayish brown (10YR 4/2) clay films; strongly acid; clear wavy boundary.

Btx2—30 to 36 inches; yellowish brown (10YR 5/4) silt loam; common medium distinct grayish brown (10YR 5/2) and yellowish brown (10YR 5/6) mottles; moderate very coarse prismatic structure parting to moderate medium platy; brittle and very firm; many black (N 2/0) stains and concretions of iron and manganese oxide; many faint dark yellowish brown (10YR 4/4) clay films on horizontal faces of peds; many distinct gray (10YR 5/1) clay films on vertical faces of peds; medium acid; clear wavy boundary.

Btx3—36 to 44 inches; yellowish brown (10YR 5/4) silty clay loam; common medium faint yellowish brown (10YR 5/6) and distinct gray (10YR 5/1) mottles; weak very coarse prismatic structure; firm; many faint dark yellowish brown (10YR 4/4) clay films on faces of peds; many distinct grayish brown (10YR 5/2) clay films on vertical surfaces of peds; slightly acid; gradual smooth boundary.

BC—44 to 58 inches; yellowish brown (10YR 5/4) silty clay loam; many coarse distinct dark grayish brown (10YR 4/2) and gray (10YR 5/1) mottles; weak very coarse prismatic structure; firm; neutral; abrupt wavy boundary.

2C—58 to 66 inches; brown (10YR 4/3) silty clay; massive; stratified; firm; common distinct grayish brown (10YR 5/2) clay films on faces of vertical cracks; slightly acid.

The thickness of the solum ranges from 40 to 100 inches. Depth to the fragipan ranges from 18 to 36 inches. Coarse fragments are generally water-worn gravel. The content of coarse fragments is as much as 5 percent above the fragipan. It is as much as 10 percent in the Btx and BC horizons and as much as 15 percent in the 2C horizon.

The Ap horizon has chroma of 2 or 3. Some pedons have an A, E, or BE horizon. The Bt horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 to 8. It is silt loam or silty clay loam. Some pedons have a BE′ horizon above the Btx horizon. The Btx horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 3 to 6. It is generally silt loam or silty clay loam. In some pedons the Btx horizon is clay loam at a depth of more than 40 inches. The BC horizon has colors similar to those of the Btx horizon. It is silt loam or silty clay loam. The 2C horizon has hue of 7.5YR, 10YR, or 2.5Y, value of 4 to 6, and chroma of 2 to 6. It is stratified and has textures ranging from sandy loam to silty clay.

Rawson Series

The Rawson series consists of deep, moderately well drained soils on terraces in former glacial lake valleys. These soils formed in loamy deposits underlain by finer textured lacustrine deposits. Permeability is moderate in the upper part and slow or very slow in the lower part. Slopes range from 2 to 6 percent.

The Rawson soils in Muskingum County are slightly wetter than is typical for the series. This difference affects the rating of the soils for some urban uses, such as sanitary landfill.

Rawson soils commonly are adjacent to Glenford, Omulga, Markland, and Lobdell soils. Glenford, Omulga, and Markland soils are in landscape positions similar to those of the Rawson soils. Glenford soils have more silt and fewer coarse fragments in the solum than the Rawson soils. Omulga soils have a fragipan. Markland soils are more clayey in the upper part of the subsoil than the Rawson soils. Lobdell soils are on nearby flood plains or alluvial fans. They do not have an argillic horizon.

Typical pedon of Rawson silt loam, 2 to 6 percent slopes, about 2.5 miles southeast of Dresden, in Madison Township; 1,000 feet north of the intersection of Copeland Woods Road and North Branch Road, and 100 feet west; T. 3 N., R. 7 W.

Ap—0 to 10 inches; brown (10YR 4/3) silt loam, light gray (10YR 7/2) dry; moderate medium platy structure parting to moderate medium granular; friable; many medium roots; about 5 percent coarse fragments; slightly acid; abrupt smooth boundary.

Bt1—10 to 17 inches; yellowish brown (10YR 5/6) silt loam; moderate medium subangular blocky structure; firm; many fine roots; common faint yellowish brown (10YR 5/4) clay films and brown (10YR 4/3) organic coatings on faces of peds; about 5 percent coarse fragments; slightly acid; clear wavy boundary.

Bt2—17 to 25 inches; brown (7.5YR 4/4) loam; few fine prominent grayish brown (10YR 5/2) mottles; moderate coarse prismatic structure parting to weak coarse subangular blocky; very firm, but brittle and platy in places; many prominent very dark grayish brown (10YR 3/2) stains of iron and manganese oxide; common fine roots along prism cracks; many faint brown (7.5YR 5/4) clay films on faces of peds; yellowish brown (10YR 5/4) silt coatings on vertical faces of peds; about 10 percent coarse fragments; medium acid; gradual boundary.

Bt3—25 to 33 inches; brown (7.5YR 5/4) loam; common medium prominent grayish brown (10YR 5/2) mottles; strong coarse prismatic structure; very firm, but brittle and platy in places; few fine prominent very dark grayish brown (10YR 3/2) stains of iron and manganese oxide; common fine roots along prism cracks; many distinct yellowish brown (10YR 5/4) clay films on faces of peds; grayish brown (10YR 5/2) coatings on vertical faces of peds; about 10 percent coarse fragments; strongly acid; clear wavy boundary.

BC1—33 to 38 inches; brown (10YR 5/3) sandy loam; common medium yellowish brown (10YR 5/4 and 5/6) mottles; moderate coarse prismatic structure parting to moderate medium platy; friable; about 10 percent coarse fragments; medium acid; abrupt smooth boundary.

2BC2—38 to 43 inches; brown (10YR 4/3) silty clay; few medium yellowish brown (10YR 5/4) mottles; weak coarse prismatic structure; very firm; grayish brown (10YR 5/2) and gray (10YR 5/1) coatings on faces of peds; neutral; gradual wavy boundary.

2C—43 to 65 inches; brown (10YR 5/3) silty clay; massive, weakly laminated; very firm; white (10YR 8/2) nodules of secondary calcium carbonate; slight effervescence; mildly alkaline.

The thickness of the solum ranges from 30 to 48 inches. Depth to the underlying finer material is 20 to 40 inches. The coarse fragments are mostly fine gravel. The content of coarse fragments ranges from 0 to 15 percent in the A horizon and from 5 to 30 percent in the B horizon.

The Ap horizon has chroma of 2 or 3. It is dominantly silt loam, but in some pedons it is loam. Some pedons have a BE horizon. The Bt and BC horizons have hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 to 6. They are silt loam, loam, sandy loam, or gravelly clay loam. They are brittle in the lower part in some pedons. The 2C horizon is silty clay loam or silty clay.

Rigley Series

The Rigley series consists of deep, well drained soils on hillsides and ridgetops. These soils formed in colluvium derived from soft, argillaceous sandstone. Permeability is moderately rapid. Slopes range from 8 to 40 percent.

Rigley soils are similar to Westmoreland soils and are commonly adjacent to Berks, Coshocton, and Gilpin soils. Westmoreland soils have more clay in the subsoil than the Rigley soils. Coshocton soils are in concave landscape positions and are moderately well drained. They are more clayey than the Rigley soils. Berks and Gilpin soils are in landscape positions similar to those of the Rigley soils. They are moderately deep over bedrock.

Typical pedon of Rigley channery loam, in an area of Rigley-Coshocton complex, 25 to 40 percent slopes, about 1.5 miles southeast of Frazeysburg, in Jackson Township; 4,000 feet south of the intersection of Shannon Road and Baker Road, 1,450 feet east along the township line, and 100 feet north; in sec. 21, T. 3 N., R. 9 W.

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) channery loam, very pale brown (10YR 7/3) dry; weak fine granular structure; friable; about 20 percent sandstone channers; very strongly acid; abrupt smooth boundary.

BE—6 to 12 inches; yellowish brown (10YR 5/4) channery loam; weak fine and medium subangular blocky structure; very friable; common faint dark yellowish brown (10YR 4/4) silt coatings on faces of peds; about 15 percent sandstone channers; strongly acid; clear smooth boundary.

Bt1—12 to 18 inches; yellowish brown (10YR 5/4) channery loam; moderate medium angular blocky structure; very friable; common faint brown (10YR 4/3) clay films on faces of peds; about 15 percent sandstone channers; strongly acid; clear smooth boundary.

Bt2—18 to 26 inches; yellowish brown (10YR 5/4) channery sandy loam; weak coarse and medium angular blocky structure; very friable; many distinct dark brown (7.5YR 4/4) clay films on faces of peds; common coarse faint pale brown (10YR 6/3) margins of channers; about 30 percent sandstone channers; strongly acid; clear wavy boundary.

Bt3—26 to 32 inches; yellowish brown (10YR 5/4) channery sandy loam; weak coarse subangular blocky structure; very friable; common faint dark brown (2.5YR 4/4) clay films on faces of peds; about 30 percent sandstone channers; very strongly acid; clear wavy boundary.

BC—32 to 48 inches; yellowish brown (10YR 5/4) channery loamy sand; weak coarse subangular blocky structure; common faint dark yellowish brown (10YR 4/4) clay films on faces of peds; common fine black (10YR 2/1) concretions of iron and manganese oxide; common coarse faint pale brown (10YR 6/3) margins of channers; about 35 percent sandstone channers; very strongly acid; clear smooth boundary.

C—48 to 60 inches; pale brown (10YR 6/3) channery loamy sand; many coarse faint yellowish brown (10YR 5/4) mottles; massive; very friable; about 30 percent sandstone channers; very strongly acid.

The thickness of the solum ranges from 40 to 60 inches. The depth to sandstone, siltstone, or shale bedrock ranges from 60 to more than 100 inches. The content of sandstone and siltstone pebbles, cobbles, channers, and stones ranges from 5 to 35 percent in the solum and from 20 to 70 percent in the C horizon.

The Ap horizon has value of 4 or 5 and chroma of 2 or 3. Pedons in undisturbed areas have a very dark A horizon and a light brown E horizon. The fine-earth fraction of the A and E horizons is sandy loam, fine sandy loam, loam, or the channery analogs of those textures. The Bt horizon has hue of 10YR or 7.5YR and value and chroma of 4 to 6. Some pedons have low-chroma mottles at a depth of more than 36 inches. The Bt horizon is sandy loam, loam, or the gravelly or channery analogs of those textures. The C horizon has the same colors as those of the Bt horizon. It is loamy sand, sandy loam, loam, clay loam, or the channery or very channery analogs of those textures. Some pedons have a Cr horizon of soft, weathered sandstone bedrock at a depth of more than 60 inches.

Rodman Series

The Rodman series consists of deep, excessively drained soils on terrace escarpments. These soils formed in stratified glacial outwash. Permeability is moderately rapid in the subsoil and very rapid in the underlying material. Slopes range from 25 to 70 percent.

Rodman soils are commonly adjacent to Watertown and Chili soils and to the sandy-skeletal Udorthents. The well drained Watertown and Chili soils are on the less sloping parts of terraces. They have an argillic horizon and do not have a mollic epipedon. Udorthents are in areas where sand and gravel have been mined. They do not have a dark surface layer.

Typical pedon of Rodman gravelly sandy loam, 25 to 70 percent slopes, about 2 miles south of Dresden, in Jefferson Township; 200 feet northeast of the intersection of Dresden Road and McGlade School Road; T. 3 N., R. 8 W.

A—0 to 9 inches; black (10YR 2/1) gravelly sandy loam, dark gray (10YR 4/1) dry; weak fine granular structure; very friable; many fine and medium roots; about 25 percent gravel; slightly acid; abrupt smooth boundary.

AB—9 to 12 inches; very dark grayish brown (10YR 3/2) and dark yellowish brown (10YR 4/4) gravelly sandy loam; weak medium subangular blocky structure; very friable; many fine and medium roots; about 25 percent gravel; slightly acid; clear smooth boundary.

Bw—12 to 20 inches; dark brown (7.5YR 4/4) gravelly sandy loam; weak medium subangular blocky structure; very friable; many fine roots; about 30 percent gravel; slightly acid; clear irregular boundary.

C1—20 to 26 inches; dark brown (7.5YR 4/4) very gravelly loamy sand; single grained; loose; common fine roots; about 40 percent gravel; neutral; clear wavy boundary.

C2—26 to 60 inches; dark yellowish brown (10YR 4/4) very gravelly sand; single grained; loose; accumulation of secondary calcium carbonate on the lower side of coarse fragments at the upper boundary; about 40 percent gravel; strong effervescence; moderately alkaline.

The thickness of the solum and the depth to free carbonates range from 12 to 30 inches. The content of coarse fragments ranges from 10 to 25 percent in the A horizon, from 20 to 30 percent in the Bw horizon, and from 35 to 70 percent in the C horizon.

The A horizon has hue of 10YR or 7.5YR, value of 2 or 3, and chroma of 1 or 2. It is gravelly loam, loam, gravelly sandy loam, or sandy loam. The Bw horizon has hue of 10YR or 7.5YR, value of 3 to 5, and chroma of 3 or 4. It is gravelly loam, gravelly sandy loam, sandy loam, loam, or very gravelly sandy loam. The C horizon has value of 3 to 5 and chroma of 1 to 4.

Sebring Series

The Sebring series consists of deep, poorly drained soils on broad flats in filled valleys. These soils formed in silty lacustrine sediments. Permeability is moderately slow. Slopes range from 0 to 2 percent.

Sebring soils are commonly adjacent to Luray, Lorain, Fitchville, and Melvin soils. The somewhat poorly drained Fitchville soils are in the slightly higher landscape positions. They have a subsoil that is not as gray as that of the Sebring soils. Melvin soils are on nearby flood plains and are frequently flooded. Luray and Lorain soils are in landscape positions similar to those of the Sebring soils. They are very poorly drained and have a darker surface layer than that of the Sebring soils.

Typical pedon of Sebring silt loam, 4.3 miles southwest of Dresden, in Muskingum Township; 3,300 feet west of the intersection of State Route 60 and Shannon Road, and 500 feet south; in sec. 4, R. 8 W., T. 2 N.

Ap—0 to 10 inches; dark gray (10YR 4/1) silt loam, light brownish gray (10YR 6/2) dry; common medium distinct very dark grayish brown (10YR 3/2) mottles; moderate medium angular blocky structure parting to weak medium granular; firm; common medium roots; slightly acid; abrupt smooth boundary.

Btg1—10 to 17 inches; grayish brown (10YR 5/2) silty clay loam; common fine distinct yellowish brown (10YR 5/4) mottles; firm; weak medium prismatic structure parting to moderate medium subangular blocky; many distinct dark gray (10YR 4/1) organic clay films on vertical faces of peds; common coarse very dark gray (10YR 3/1) krotovinas; few fine roots; medium acid; clear wavy boundary.

Btg2—17 to 30 inches; dark grayish brown (2.5YR 4/2) silty clay loam; few fine distinct yellowish brown (10YR 5/4) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; firm; many distinct dark grayish brown (10YR 4/2) clay films on faces of peds; few fine roots; slightly acid; clear wavy boundary.

Btg3—30 to 45 inches; grayish brown (10YR 5/2) silty clay loam; few medium distinct dark gray (10YR 4/1) and common medium distinct yellowish brown (10YR 5/4) mottles; weak coarse prismatic structure; firm; few fine prominent very dark brown (10YR 2/2) stains of iron and manganese oxide; many distinct dark grayish brown (10YR 4/2) clay films on faces of peds; slightly acid; clear wavy boundary.

BC—45 to 55 inches; yellowish brown (10YR 5/4) silty clay loam; few medium faint yellowish brown (10YR 5/6) and common medium distinct grayish brown (10YR 5/2) mottles; weak coarse prismatic structure parting to thin laminations; firm; neutral; clear wavy boundary.

C—55 to 60 inches; grayish brown (10YR 5/2) silt loam; many medium distinct yellowish brown (10YR 5/4) mottles; massive; weak thin laminations; firm; neutral.

The thickness of the solum ranges from 30 to 55 inches. The content of coarse fragments ranges from 0 to 3 percent in the A and B horizons and from 0 to 10 percent in the C horizon.

The Ap horizon has value of 4 or 5 and chroma of 1 or 2. Some pedons have A, E, and BE horizons. The A horizon is dominantly silt loam but is silty clay loam in some pedons. The Btg horizon has hue of 10YR or 2.5YR or is neutral in hue. It has value of 4 to 6. It has chroma of 0 to 2 within a depth of 30 inches and chroma of 0 to 6 at a depth of more than 30 inches. It has common or many mottles. It is silty clay loam or silt loam and has thin strata of loam or clay loam that are less than 3 inches thick. The C horizon has hue of 10YR or 2.5YR or is neutral in hue. It has value of 4 to 6 and chroma of 0 to 6. It is stratified or laminated. It is commonly silt loam or silty clay loam, but in some pedons it is clay loam or sandy loam.

Stonelick Series

The Stonelick series consists of deep, well drained soils on flood plains. These soils formed in stratified, calcareous alluvium. Permeability is moderately rapid. Slopes range from 0 to 2 percent.

Stonelick soils are similar to Tioga and Chagrin soils and are commonly adjacent to Nolin and Lindside soils on the flood plains. Tioga soils are more acid than the Stonelick soils and have a cambic horizon. Chagrin, Nolin, and Lindside soils have a lower content of sand than the Stonelick soils and are noncalcareous. Lindside soils are moderately well drained.

Typical pedon of Stonelick loam, occasionally flooded, 0.75 mile southwest of Nashport, in Licking Township; 700 feet east of the north abutment of the Licking River Bridge on Pleasant Valley Road; T. 2 N., R. 9 W.

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) loam, light brownish gray (10YR 6/2) dry; moderate medium granular structure; friable; many fine roots; many very dark grayish brown (10YR 3/2) wormcasts and common brown (10YR 4/3) streaks; strong effervescence; moderately alkaline; clear smooth boundary.

C1—6 to 12 inches; brown (10YR 4/3) and dark grayish brown (10YR 4/2) loam; weak medium subangular blocky structure; friable; many fine roots; many very dark grayish brown (10YR 3/2) wormcasts and coatings; strong effervescence; moderately alkaline; abrupt smooth boundary.

C2—12 to 18 inches; brown (10YR 4/3) fine sandy loam; weak medium subangular blocky; very friable; common very dark grayish brown (10YR 3/2) wormcasts and continuous dark grayish brown (10YR 4/2) coatings; strong effervescence; moderately alkaline; abrupt smooth boundary.

C3—18 to 39 inches; dark grayish brown (10YR 4/2) loam; weak medium prismatic structure parting to moderate medium platy; friable; common very dark grayish brown (10YR 3/2) wormcasts; slight effervescence; mildly alkaline; clear smooth boundary.

C4—39 to 51 inches; brown (10YR 4/3) loam; weak medium prismatic structure; friable; continuous dark grayish brown (10YR 4/2) coatings on vertical faces of peds; slight effervescence; mildly alkaline; clear smooth boundary.

C5—51 to 60 inches; dark grayish brown (10YR 4/2) silt loam; weak coarse subangular blocky structure; friable; slight effervescence; mildly alkaline; clear smooth boundary.

C6—60 to 71 inches; dark grayish brown (10YR 4/2) loam; friable; thin laminated strata of silt loam and fine sand; slight effervescence; mildly alkaline; clear smooth boundary.

C7—71 to 75 inches; light yellowish brown (10YR 6/4) loamy fine sand; loose; single grained; slight effervescence; mildly alkaline.

The content of coarse fragments ranges from 0 to 5 percent in the Ap horizon and from 0 to 10 percent in the C horizon. Commonly, the middle and lower parts of the C horizon are finely stratified.

The Ap horizon has value of 3 or 4 and chroma of 2 or 3. It is loam, silt loam, or fine sandy loam. The C horizon has value of 4 or 5 and chroma of 2 to 4. It is stratified loam, silt loam, fine sandy loam, and sandy loam. Some pedons have thin subhorizons of loamy fine sand.

Tioga Series

The Tioga series consists of deep, well drained soils on flood plains. These soils formed in stratified, recent loamy and sandy alluvium. Permeability is moderate or moderately rapid. Slopes range from 0 to 3 percent.

Tioga soils are similar to Chagrin and Stonelick soils and are commonly adjacent to Watertown, Nolin, and Chavies soils. Chagrin soils have a lower content of sand and a higher content of clay than the Tioga soils. Stonelick soils are mildly alkaline or moderately alkaline throughout. Watertown and Chavies soils are on terraces and are not subject to flooding. They have an argillic horizon. Nolin soils are in landscape positions similar to those of the Tioga soils. They have more silt and less sand than the Tioga soils.

Typical pedon of Tioga fine sandy loam, rarely flooded, 1.3 miles northeast of Dresden, in Cass Township; 1.3 miles east of the intersection of Dresden Road and Gene Cox Memorial Drive, and 25 feet north of the road; T. 3 N., R. 7 W.

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) fine sandy loam, light brownish gray (10YR 6/2) dry; moderate medium granular structure; very friable; many fine and medium pores; many fine roots; slightly acid; abrupt smooth boundary.

Bw1—8 to 14 inches; dark yellowish brown (10YR 4/4) fine sandy loam; moderate medium subangular blocky structure; friable; many fine roots; many distinct dark grayish brown (10YR 4/2) coatings; slightly acid; clear smooth boundary.

Bw2—14 to 24 inches; dark brown (7.5YR 4/4) fine sandy loam; moderate coarse subangular blocky structure; friable; common fine roots; many faint brown (10YR 4/3) coatings; many medium pores; neutral; clear smooth boundary.

Bw3—24 to 34 inches; dark brown (7.5YR 4/4) sandy loam; weak coarse subangular blocky structure; very friable; few fine roots; slightly acid; clear wavy boundary.

C—34 to 60 inches; brown (10YR 5/3) loamy fine sand; single grained; loose; slightly acid.

The thickness of the solum ranges from 18 to 40 inches. The content of coarse fragments ranges from 0 to 15 percent in the A and Bw horizons and from 0 to 30 percent in the C horizon.

The A horizon has value of 3 to 5 and chroma of 2 to 4. The Bw horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 2 to 4. It ranges from fine sandy loam to silt loam and has thin subhorizons of sandy loam or loamy sand. The C horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 2 to 4. It ranges from loamy sand to fine sandy loam and the gravelly analogs of those textures.

Upshur Series

The Upshur series consists of deep, well drained, slowly permeable soils on dissected benches and hillsides. These soils formed in weathered red shale. Slopes range from 2 to 25 percent.

Upshur soils are commonly adjacent to Gilpin, Guernsey, Lowell, and Westgate soils. These adjacent soils are in landscape positions similar to those of the Upshur soils. They do not have reddish colors in the upper part of the subsoil. Guernsey and Lowell soils have dominantly yellowish brown and brown colors throughout the subsoil. Westgate soils are moderately well drained. They have strong brown, silty layers above the reddish, clayey underlying material. Gilpin soils are moderately deep. They have a lower content of clay than the Upshur soils.

Typical pedon of Upshur silty clay loam, in an area of Guernsey-Upshur silty clay loams, 6 to 15 percent slopes, eroded, about 4 miles south of Norwich, in Rich Hill Township; 1,000 feet east of the intersection of Southern Road and Clay Pike, and 100 feet north along the east section line of sec. 6, T. 13 N., R. 5 W.

Ap—0 to 4 inches; dark brown (7.5YR 3/4) silty clay loam, light brown (7.5YR 6/4) dry; moderate fine subangular blocky structure; firm; many fine and medium roots; slightly acid; abrupt smooth boundary.

Bt1—4 to 20 inches; yellowish red (5YR 4/6) silty clay; strong fine subangular blocky structure; firm; many fine and medium roots; many faint clay films; strongly acid; clear wavy boundary.

Bt2—20 to 32 inches; dark reddish brown (5YR 3/4) silty clay; moderate fine subangular blocky structure; firm; common fine and medium roots; many faint clay films; common pressure faces and slickensides; slightly acid; clear wavy boundary.

BC—32 to 40 inches; dark red (2.5YR 3/6) silty clay loam that has common fine streaks of dusky red (10YR 3/2) and strong brown (7.5YR 5/6); moderate coarse prismatic structure; firm; common fine roots; common pressure faces and slickensides; common faint clay films; mildly alkaline; gradual wavy boundary.

C1—40 to 50 inches; yellowish brown (10YR 5/6) and dark red (2.5YR 3/6) silty clay loam; massive; firm; about 10 percent coarse fragments; nodules and streaks of light gray (10YR 7/2) calcium carbonate; strong effervescence; mildly alkaline; clear smooth boundary.

C2—50 to 66 inches; dark reddish brown (2.5YR 3/4) and yellowish brown (10YR 5/8) silty clay loam; massive; firm; common fragments of light brownish gray (2.5Y 6/2) shale; strong effervescence; mildly alkaline; clear smooth boundary.

C3—66 to 74 inches; dark reddish brown (2.5YR 3/4) silty clay; strong angular blocky structure; very firm; many fine distinct light brownish gray (10YR 6/2) mottles; strong effervescence; mildly alkaline.

The thickness of the solum ranges from 25 to 50 inches. The depth to bedrock is more than 40 inches. The content of coarse fragments ranges from 0 to 15 percent in the upper part of the solum and from 0 to 35 percent in the lower part of the solum and in the C horizon.

The Ap horizon has hue of 10YR or 7.5YR, value of 3 or 4, and chroma of 2 to 4. It is silt loam, silty clay loam, or silty clay. The Bt horizon generally has hue of 5YR or 2.5YR, but it has hue of 10YR in the upper part in some pedons. The Bt horizon has value of 3 to 5 and chroma of 3 to 6. It is silty clay loam, silty clay, or clay. The C horizon has hue of 10YR to 10R, value of 3 to 5, and chroma of 4 to 6. Commonly, the colors are mixed. This horizon is silty clay loam, silty clay, clay, or the shaly or channery analogs of those textures.

Watertown Series

The Watertown series consists of deep, well drained soils on glacial outwash terraces. These soils formed in sandy deposits. Permeability is moderately rapid in the upper part of the subsoil and rapid in the lower part of the subsoil and in the underlying material. Slopes range from 1 to 15 percent.

Watertown soils are similar to Chavies and Lakin soils and commonly are adjacent to Chili, Cidermill, and Tioga soils. Lakin soils formed in windblown fine sand. They have a banded argillic horizon. Chavies soils have less sand in the surface layer and the upper part of the subsoil than the Watertown soils. Chili and Cidermill soils are in landscape positions similar to those of the Watertown soils. Chili soils have more clay and gravel in the subsoil than the Watertown soils. Cidermill soils have more silt and less sand in the subsoil than the Watertown soils. Tioga soils are on nearby flood plains and are subject to flooding.

Typical pedon of Watertown sandy loam, 1 to 8 percent slopes, about 1 mile north of Dresden, in Cass Township; 1,300 feet northeast of the intersection of Gene Cox Drive and Dresden Road, and 600 feet east; T. 3 N., R. 8 W.

Ap—0 to 12 inches; dark yellowish brown (10YR 3/4) sandy loam, pale brown (10YR 6/3) dry; weak fine granular structure; very friable; many fine roots; dark brown (7.5YR 3/4) coatings on faces of peds; few fine gravel fragments; strongly acid; abrupt smooth boundary.

Bt1—12 to 17 inches; yellowish brown (10YR 5/4) sandy loam; moderate medium subangular blocky structure; friable; common fine roots; common distinct brown (7.5YR 4/4) clay film bridges between sand grains; few fine gravel fragments; medium acid; gradual wavy boundary.

Bt2—17 to 25 inches; yellowish brown (10YR 5/4) sandy loam; weak coarse subangular blocky structure; friable; common fine roots; few faint yellowish brown (10YR 5/4) clay film bridges between sand grains; about 5 percent fine gravel; strongly acid; clear smooth boundary.

BC—25 to 42 inches; brown (7.5YR 4/4) loamy sand; weak coarse subangular blocky structure; very friable; few fine roots; about 5 percent fine gravel; strongly acid; abrupt smooth boundary.

C1—42 to 72 inches; yellowish brown (10YR 5/4) gravelly coarse sand; single grained; loose; about 20 percent fine gravel; strongly acid; abrupt wavy boundary.

C2—72 to 80 inches; brown (10YR 5/3) very gravelly coarse sand; single grained; loose; about 40 percent gravel; slight effervescence; mildly alkaline.

The thickness of the solum ranges from 25 to 60 inches. The content of gravel ranges from 0 to 20 percent in the A horizon, from 0 to 35 percent in the Bt horizon, and from 0 to 60 percent in the C horizon. The average content of gravel in the control section is less than 25 percent.

The Ap horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 2 to 4. The A horizon, if it occurs, typically is sandy loam, but in some pedons it is fine sandy loam. The Bt horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 6. It is sandy loam, gravelly sandy loam, loamy sand, or gravelly loamy sand. The C horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 2 to 6. It is loamy sand, loamy coarse sand, sand, coarse sand, or the gravelly or very gravelly analogs of those textures.

Wellston Series

The Wellston series consists of deep, well drained soils on ridgetops. These soils formed in loess and in the underlying material weathered from fine grained sandstone or siltstone. Permeability is moderate. Slopes range from 2 to 15 percent.

Wellston soils are similar to Alford and Westgate soils and are commonly adjacent to Gilpin, Keene, Westmoreland, and Zanesville soils. Alford soils do not have coarse fragments in the lower part of the subsoil. Westgate soils are moderately well drained. They have more clay in the lower part of the subsoil than the Wellston soils. Westmoreland soils are on nearby hillsides. They have coarse fragments throughout. Gilpin, Keene, and Zanesville soils are in landscape positions similar to those of the Wellston soils. Gilpin soils are moderately deep over siltstone. Keene soils are moderately well drained. Zanesville soils have a fragipan.

Typical pedon of Wellston silt loam, 2 to 8 percent slopes, about 6.5 miles east of Zanesville, in Perry Township; 1,100 feet north-northeast of the intersection of Brown Drive and Airwood Drive, and 100 feet west; T. 13 N., R. 12 W.

Ap—0 to 7 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; moderate fine granular structure; friable; many fine roots; slightly acid; abrupt smooth boundary.

Bt1—7 to 15 inches; brown (7.5YR 5/4) silt loam; moderate medium and fine subangular blocky structure; friable; common fine roots; brown (10YR 4/3) krotovinas; common faint clay films; slightly acid; gradual smooth boundary.

Bt2—15 to 24 inches; brown (7.5YR 5/4) silty clay loam; moderate medium angular blocky structure; friable; common fine roots; many faint clay films; slightly acid; gradual smooth boundary.

Bt3—24 to 32 inches; brown (7.5YR 5/6) silt loam; moderate medium angular blocky structure parting to moderate medium platy; firm; many faint clay films; discontinuous layers and streaks of pale brown (10YR 6/3) silt loam; common black (10YR 2/1) stains of iron and manganese oxide; common fine roots; strongly acid; abrupt smooth boundary.

2Bt4—32 to 48 inches; yellowish brown (10YR 5/6) silty clay loam; few medium distinct light brownish gray (2.5Y 6/2) mottles; moderate medium prismatic structure; firm; many distinct brown (7.5YR 5/4) clay films; many fine mica flakes; strongly acid; gradual smooth boundary.

2Cr—48 to 50 inches; light olive brown (2.5YR 5/4), soft, weathered sandstone bedrock; massive; about 15 percent sandstone fragments.

The thickness of the solum ranges from 32 to 55 inches. The depth to bedrock ranges from 40 to 72 inches. The content of coarse fragments of siltstone, sandstone, or shale ranges from 0 to 5 percent in the A, E, and Bt horizons and from 0 to 35 percent in the 2Bt horizon.

The Ap horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 2 to 6. Some pedons in wooded areas have A and E horizons. Some pedons in eroded areas do not have a BE horizon. The Bt horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. It is silty clay loam or silt loam. The 2Bt horizon has hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 3 to 6. It is silt loam, loam, silty clay loam, clay loam, or the channery or gravelly analogs of those textures. Some pedons have a 2BC horizon.

Westgate Series

The Westgate series consists of deep, moderately well drained soils on ridgetops or benches. These soils formed in a silty mantle and in the underlying material weathered from siltstone, shale, limestone, and sandstone. Permeability is moderate in the silty mantle and slow in the lower part of the subsoil and in the underlying material. Slopes range from 2 to 15 percent.

Westgate soils are similar to Keene and Wellston soils and are commonly adjacent to Lowell, Zanesville, and Upshur soils. Keene soils have yellower hues in the lower part of the subsoil than the Westgate soils. Wellston soils are well drained. Lowell and Upshur soils are on ridgetops or hillsides. They have more clay in the upper part of the subsoil than the Westgate soils. Zanesville soils are in landscape positions similar to those of the Westgate soils. They have a fragipan.

Typical pedon of Westgate silt loam, 2 to 6 percent slopes, about 3.5 miles southeast of Duncan Falls, in Blue Rock Township; about 1,710 feet south and 1,740 west of the northeast corner of sec. 3, T. 12 N., R. 12 W.

Oi—0.5 inch to 0; continuous mat of pine needles.

Ap—0 to 7 inches; brown (10YR 5/3) silt loam, very pale brown (10YR 7/3) dry; weak medium platy structure parting to weak fine granular; very friable; many fine roots; darkened by accumulation of organic matter in the upper 1 inch; extremely acid; clear smooth boundary.

BE—7 to 12 inches; strong brown (7.5YR 5/6) silt loam; weak medium platy structure parting to moderate very fine subangular blocky; friable; common medium roots; many distinct yellowish brown (10YR 5/4) silt coatings on faces of peds; strongly acid; clear smooth boundary.

Bt1—12 to 18 inches; strong brown (7.5YR 5/6) silt loam; moderate fine and medium subangular blocky structure; friable; common medium roots; common distinct yellowish brown (10YR 5/4) silt coatings and common faint brown (7.5YR 5/4) clay films on faces of peds; very strongly acid; gradual smooth boundary.

Bt2—18 to 28 inches; strong brown (7.5YR 5/6) silt loam; moderate fine and medium subangular blocky structure; friable; common medium roots; few distinct yellowish brown (10YR 5/4) silt coatings; many distinct reddish brown (5YR 5/4) and common faint brown (7.5YR 5/4) clay films on faces of peds; strongly acid; clear smooth boundary.

Bt3—28 to 34 inches; strong brown (7.5YR 5/6) silty clay loam; few fine prominent grayish brown (10YR 5/2) mottles; moderate medium prismatic structure parting to moderate medium subangular blocky; friable; common fine roots; many distinct brown (10YR 5/3) silt coatings on faces of peds; many faint and distinct brown (7.5YR 5/4) and reddish brown (5YR 4/4 and 5/4) clay films on faces of peds; very strongly acid; abrupt smooth boundary.

2Bt4—34 to 43 inches; yellowish red (5YR 4/6) silty clay; moderate medium prismatic structure parting to moderate medium angular blocky; firm; common fine roots; common distinct brown (10YR 5/3) silt coatings in the upper part; many faint reddish brown (5YR 4/4) clay films on faces of peds; few fine nonintersecting slickensides; strongly acid; clear wavy boundary.

2Bt5—43 to 57 inches; yellowish red (5YR 4/6) clay; moderate medium prismatic structure parting to moderate medium subangular blocky; very firm; few fine roots; few black (N 2/0) coatings of iron and manganese oxide on faces of peds; many black (N 2/0) stains and few fine concretions of iron and manganese oxide concentrated at the top of the horizon; many faint reddish brown (5YR 4/4) clay films on faces of peds; many coarse intersecting and nonintersecting slickensides; neutral in the matrix, but moderately alkaline in soft accumulations that are mainly in the lower part; abrupt wavy boundary.

2BC—57 to 66 inches; yellowish red (5YR 4/6) silty clay loam; common medium prominent light red (2.5YR 6/8) and common coarse prominent dusky red (10R 3/3) mottles; moderate coarse prismatic structure parting to moderate fine angular blocky; firm; many distinct reddish brown (5YR 5/4) clay films on vertical faces of peds; few black (N 2/0) stains of iron and manganese oxide on faces of prisms; large, widely spaced slickensides; common very pale brown (10YR 7/3), soft accumulations of calcium carbonate in the matrix; slight effervescence; moderately alkaline; gradual wavy boundary.

2C—66 to 75 inches; variegated yellowish red (5YR 4/6), olive yellow (2.5Y 6/8), and dusky red (10R 3/3) silty clay loam that has pockets of light olive gray (5Y 6/2); moderate coarse prismatic structure parting to moderate fine angular blocky; firm; many very pale brown (10YR 7/3), soft accumulations of calcium carbonate in the matrix; strong effervescence; moderately alkaline; gradual wavy boundary.

2Cr—75 to 80 inches; variegated, weathered clay shale bedrock; many soft accumulations of calcium carbonate on rock surfaces; strong effervescence.

The thickness of the solum ranges from 40 to 72 inches. The depth to bedrock ranges from 60 to 80 inches. The thickness of the silty mantle ranges from 24 to 40 inches. The content of rock fragments, mainly small chips or channers of siltstone or shale, ranges from 0 to 5 percent, by volume, in the silty mantle, from 0 to 15 percent in the 2Bt and 2BC horizons, and from 0 to 30 percent in the 2C horizon.

The Ap horizon has hue of 10YR, value of 4 to 6, and chroma of 3 or 4. Some pedons in undisturbed areas have an A horizon and an E horizon. The Bt horizon has hue of 10YR or 7.5YR and value and chroma of 4 to 6. It has low-chroma mottles at a depth of more than 18 inches. It is silty clay loam or silt loam. The 2Bt horizon has hue of 10YR or 2.5YR, value of 4 to 6, and chroma of 3 to 6. In some pedons, it is mottled and at least one subhorizon has dominant hue of 5YR or redder. This horizon is silty clay loam, silty clay, or clay. The 2BC and 2C horizons commonly are variegated and have highly contrasting colors. They have hue of 5Y to 10R, value of 3 to 6, and chroma of 2 to 5, but hue of 2.5YR or 10R and chroma of 2 are not common in the 2C horizon. These horizons are silty clay loam, silty clay, or the shaly or channery analogs of those textures. The bedrock is soft shale or siltstone.

Westmoreland Series

The Westmoreland series consists of deep, well drained, moderately permeable soils on dissected hillsides and ridgetops. These soils formed in colluvium and material weathered from siltstone, shale, and sandstone. Slopes range from 8 to 70 percent.

Westmoreland soils are similar to Gilpin soils and are commonly adjacent to Berks, Coshocton, Guernsey, and Wellston soils. Berks and Gilpin soils are moderately deep over bedrock. Berks soils are on hillsides. Gilpin soils are on ridgetops. Coshocton and Guernsey soils are moderately well drained. Guernsey soils are on hillsides and benches. Coshocton soils are on concave hillsides. Wellston soils are on ridgetops. They have more silt and fewer coarse fragments in the upper part of the profile than the Westmoreland soils.

Typical pedon of Westmoreland silt loam, 15 to 25 percent slopes, eroded, about 6 miles west of Zanesville, in Hopewell Township; about 200 feet east and 700 feet north of the southwest corner of sec. 20, T. 1 N., R. 9 W.

A—0 to 3 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; moderate fine granular structure; friable; many fine and medium roots; about 5 percent coarse fragments; medium acid; clear smooth boundary.

E—3 to 6 inches; grayish brown (10YR 5/2) silt loam; moderate fine subangular blocky structure; friable; many fine and medium roots; about 5 percent coarse fragments; strongly acid; clear smooth boundary.

BE—6 to 11 inches; yellowish brown (10YR 5/4) silt loam; moderate fine subangular blocky structure; friable; many fine and common medium roots; about 5 percent coarse fragments; strongly acid; gradual smooth boundary.

Bt1—11 to 20 inches; yellowish brown (10YR 5/4) channery silty clay loam; moderate medium subangular blocky structure; firm; common medium roots; common faint brown (10YR 4/3) clay films on faces of peds; about 20 percent coarse fragments; strongly acid; gradual smooth boundary.

Bt2—20 to 32 inches; dark yellowish brown (10YR 4/4) channery silty clay loam; moderate medium subangular blocky structure; firm; few fine roots; common distinct light brown (7.5YR 6/4) clay films on faces of peds; about 25 percent light olive brown (2.5Y 5/4) siltstone fragments; strongly acid; clear smooth boundary.

BC—32 to 38 inches; brown (10YR 4/3) very channery silty clay loam; moderate coarse subangular blocky structure parting to moderate thin platy; very firm;

few distinct light brown (7.5YR 6/4) clay films on faces of peds; about 50 percent light olive brown (2.5Y 5/4), soft siltstone fragments; strongly acid; clear smooth boundary.

C—38 to 44 inches; brown (10YR 4/3) very channery silt loam; very firm; can be cut with a spade when moist; moderate medium platy rocklike structure; about 50 percent dark grayish brown (2.5Y 4/2), soft siltstone; strongly acid; gradual smooth boundary.

Cr—44 to 50 inches; dark grayish brown (2.5YR 4/2), weathered siltstone bedrock; can be cut with a spade.

R—50 to 52 inches; siltstone bedrock; cannot be cut with a spade.

The thickness of the solum ranges from 20 to 40 inches. The depth to bedrock ranges from 40 to more than 72 inches. The content of coarse fragments of siltstone, shale, or sandstone ranges from 2 to 15 percent in the A horizon, from 2 to 30 percent in the Bt horizon, from 5 to 70 percent in the BC horizon, and from 45 to 90 percent in the C horizon.

The A horizon has value of 3 or 4. It is dominantly silt loam, but in some pedons it is loam or silty clay loam. Some pedons have an Ap horizon. The Bt horizon has hue of 7.5YR or 10YR and chroma of 4 to 8. It is silty clay loam, silt loam, loam, or the shaly or channery analogs of those textures. The C horizon has hue of 7.5YR, 10YR, or 2.5Y, value of 4 or 5, and chroma of 4 to 8. It is the very channery, extremely channery, very shaly, or extremely shaly analogs of silty clay loam, silt loam, or loam.

Zanesville Series

The Zanesville series consists of deep, moderately well drained and well drained soils on upland ridgetops. These soils formed in loess and in the underlying material weathered from shale, siltstone, or sandstone. They have a fragipan. Permeability is moderate above the fragipan and moderately slow or slow in the fragipan. Slopes range from 2 to 15 percent.

Zanesville soils are similar to Cincinnati and Omulga soils and are commonly adjacent to Alford, Keene, Westgate, and Wellston soils. Cincinnati soils have glacial pebbles in the lower part of the subsoil. Omulga soils are on terraces and foot slopes. Alford, Keene, Wellston, and Westgate soils are in landscape positions similar to those of the Zanesville soils. They do not have a fragipan. Wellston and Alford soils are well drained.

Typical pedon of Zanesville silt loam, 2 to 6 percent slopes, about 1.1 miles southwest of Otsego, in Monroe Township; 1,500 feet northeast of the intersection of Dent Road and State Route 93, and 350 feet north; T. 3 N., R. 5 W.

Ap—0 to 7 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; weak fine granular structure; friable; many fine roots; medium acid; abrupt smooth boundary.

BE—7 to 14 inches; yellowish brown (10YR 5/4) silt loam; weak medium subangular blocky structure; many faint brown (10YR 5/3) silt coatings on faces of peds; friable; many fine roots and pores; medium acid; clear smooth boundary.

Bt1—14 to 19 inches; yellowish brown (10YR 5/4) silt loam; moderate medium subangular blocky structure; friable; common fine roots and pores; common faint dark yellowish brown (10YR 4/4) clay films on faces of peds; strongly acid; clear smooth boundary.

Bt2—19 to 23 inches; yellowish brown (10YR 5/6) silt loam; weak medium subangular blocky structure; friable; common fine roots and few fine pores; common distinct dark yellowish brown (10YR 4/4) clay films on faces of peds and common distinct brown (10YR 5/3) silt coatings; strongly acid; clear smooth boundary.

Bt/E—23 to 28 inches; dark yellowish brown (10YR 4/4) silt loam; few medium distinct light brownish gray (2.5Y 6/2) mottles; weak medium subangular blocky structure; friable; few fine roots; common faint dark yellowish brown (10YR 4/4) clay films on faces of peds; pale brown (10YR 6/3) and yellowish brown (10YR 5/4), distinctly vesicular E material; strongly acid; abrupt wavy boundary.

Btx1—28 to 34 inches; yellowish brown (10YR 5/4) silt loam; few medium distinct light brownish gray (2.5Y 6/2) mottles; weak very coarse prismatic structure; firm; few roots along faces of prisms; slightly brittle; many prominent light brownish gray (2.5Y 6/2) and strong brown (7.5YR 5/6) clay films on faces of prisms; common pale brown (10YR 6/3) silt coatings; common fine distinct black (N 2/0) stains of iron and manganese oxide; common faint dark yellowish brown (10YR 4/4) clay films in pores; very strongly acid; clear smooth boundary.

Btx2—34 to 38 inches; yellowish brown (10YR 5/4) silty clay loam; few medium prominent light brownish gray (2.5Y 6/2) mottles; weak very coarse prismatic structure; firm, slightly brittle; light brownish gray (2.5Y 6/2) coatings on faces of prisms; strongly acid; abrupt smooth boundary.

Btx3—38 to 45 inches; yellowish brown (10YR 5/6) silty clay loam; few fine faint yellowish brown (10YR 5/8) mottles; moderate coarse prismatic structure; firm; common black (10YR 2/1) stains of iron and manganese oxide; about 5 percent sandstone fragments; many distinct brown (7.5YR 5/4) and light gray (10YR 7/2) clay films; few roots; strongly acid; clear smooth boundary.

BC1—45 to 55 inches; brownish yellow (10YR 6/6) silty clay loam; few fine faint yellowish brown (10YR 5/8) mottles; moderate coarse prismatic structure; firm; few black (10YR 2/1) stains of iron and manganese oxide; many distinct brown (7.5YR 5/4) and very pale brown (10YR 7/3) clay films; about 10 percent sandstone fragments; strongly acid; gradual wavy boundary.

2BC2—55 to 62 inches; brownish yellow (10YR 6/6) channery clay loam; moderate very coarse prismatic structure; firm; few faint yellowish brown (10YR 5/6) clay films; about 15 percent sandstone fragments; strongly acid; gradual wavy boundary.

2BC3—62 to 67 inches; brownish yellow (10YR 6/6) silty clay loam; moderate very coarse prismatic structure; firm; few siltstone fragments; strongly acid; clear wavy boundary.

2C1—67 to 75 inches; yellowish brown (10YR 5/6) loam; common medium distinct pale brown (10YR 6/3) mottles; massive; friable; few siltstone fragments; strongly acid; clear wavy boundary.

2C2—75 to 80 inches; yellowish brown (10YR 5/6) channery loam; massive; firm; 20 percent siltstone fragments; strongly acid.

The thickness of the solum ranges from 35 to 70 inches. Depth to the fragipan ranges from 24 to 40 inches. The depth to soft, weathered sandstone, siltstone, or shale bedrock is more than 60 inches.

The Ap horizon has value of 4 or 5 and chroma of 2 to 4. Some pedons in wooded areas have an A horizon and an E horizon. The BE and Bt horizons have hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6. They are silt loam or silty clay loam. The Btx horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 to 6. It has few to many brown or gray mottles. It is silty clay loam, silt loam, loam, or clay loam that has 0 to 15 percent coarse fragments. The 2BC and 2C horizons, if they occur, have hue of 10YR or 2.5YR, value of 4 to 6, and chroma of 3 to 6 and have few to many brown and gray mottles. They are silt loam, loam, clay loam, silty clay loam, or the channery, gravelly, or shaly analogs of those textures. They have 0 to 35 percent coarse fragments. Some pedons have a 2Cr horizon. This horizon is interbedded sandstone, siltstone, and shale bedrock.

Formation of the Soils

This section describes the major factors of soil formation and relates them to the soils in Muskingum County. It also describes some of the processes of soil formation.

Factors of Soil Formation

The major factors that influence soil formation are parent material, plants and animals, climate, relief, and time. The differences among the soils of Muskingum County are the result of differences in one or more of these factors. The factors are interrelated in most cases. Relief, for example, is responsible for differences in the microclimate, which in turn influences the plant community at a given site. The classification of the soils is based on soil morphological features that reflect the factors and processes of soil formation *(35)*.

Parent Material

Parent material is the unconsolidated material in which soil forms. It largely determines the texture of the soil, which in turn determines the permeability and water-holding capacity of the soil *(17)*. The soils of Muskingum County formed in different kinds of parent material. Many soils formed in material weathered from sandstone, siltstone, or shale bedrock. Some formed in material deposited by flowing water, glacial ice, or wind. Some soils formed in one type of parent material, and some formed in two or more types.

Residuum is material that weathered in place from rocks. Sandstone weathers into sand or sandy loam. Siltstone weathers into silt loam. Shale weathers into silty clay loam, silty clay, or clay. Gilpin soils formed in material weathered from siltstone, and Aaron soils formed in material weathered from shale. The distinctive red color of the Upshur soils is inherited from the red shale parent material in which it formed.

Colluvium is material weathered from rock that does not stay in place. It moves downslope by a combination of gravity and water action. Colluvium is very extensive in Muskingum County. Active movement in the form of soil creep and landslides occurs on many slopes *(11)*. Brookside and Guernsey soils formed in colluvium derived mainly from clay shale. Clarksburg soils formed in colluvium derived from siltstone and sandstone. Coshocton soils formed in colluvium and residuum.

Outwash deposits, lacustrine deposits, and alluvium are parent materials deposited by water. These parent materials are quite extensive in Muskingum County.

Outwash deposits were laid down by swiftly moving water from melting glaciers. The water carried the smaller silt and clay particles downstream and left the larger sand and gravel particles behind as terraces. Soils that formed in such deposits, such as Watertown and Chili soils, are porous and well drained.

Some of the valleys in the county were blocked by the glaciers and held shallow lakes for a period of time. Silt and clay settled out of the murky waters of these lakes to form lacustrine deposits. Soils that formed in these deposits, such as Markland and Glenford soils, are silty or clayey and contain little sand or gravel.

Alluvial deposits are deposited by flowing streams. When a stream floods, it deposits a new layer of sediment on the flood plain. Soils that formed in alluvium, such as Nolin and Newark soils, have weakly expressed horizons because the process of soil formation is continually being disrupted.

Glaciers covered the western edge of the county. Glacial till deposits were laid down by the ice with little water action. Glacial till deposits contain particles of various sizes and commonly are firm and compact. Homewood soils formed in glacial till.

Many areas of the county are covered by windblown silt deposits called loess. Loess deposits covered several other parent materials, including residuum, colluvium, and glacial till. Alford soils are in areas where the loess is thick *(28)*. They are silty throughout. Some areas have a thinner mantle of loess. Keene and Westgate soils are examples of soils that are silty in the upper part of the solum, which formed in loess, and clayey in the lower part of the solum, which formed in clay shale residuum *(24)*. Similarly, Wellston soils formed in loess underlain by sandstone and siltstone residuum, and Cincinnati soils formed in loess underlain by glacial till.

Mine spoil is an artificial parent material created by surface-mining activities. It occurs in a sizable area of the county. It consists of a mixture of soil and rock. Some spoil is graded, and some is left in piles. The processes of soil formation are just beginning in soils derived from mine spoil. Morristown soils are examples.

Relief

The relief of the Allegheny Plateau region is very complex and has formed over a long period of geologic time *(21)*. Relief helps to determine the natural drainage of the soils in Muskingum County. Soils on steep slopes lose water through runoff and tend to be well drained. Soils in depressions receive water from adjacent slopes and tend to be poorly drained. Also, depressional areas are closer to the water table. Distinctly different soils can develop in the same parent material under different moisture regimes *(16)*. The moderately well drained Glenford soils and the very poorly drained Luray soils are examples. Both soils formed in silty lacustrine deposits. The Glenford soils are in convex landscape positions and have a subsoil that is well oxidized in the upper part. The Luray soils are in depressions and are saturated most of the year. Relief is not the only factor that affects the wetness of the soil. Parent material also affects drainage. For example, Watertown soils are so porous that they are well drained even where slopes are only 1 percent. The moderately slowly permeable Brookside soils on slopes of as much as 40 percent are only moderately well drained.

Erosion is most severe on the steeper slopes. Although the survey area was blanketed with windblown silt, or loess, present loess deposits are found only on the broader ridgetops, where erosion is less severe. For this reason, soils that are capped by silt, such as Wellston soils, are confined to the ridgetops. The surrounding steeper slopes are dominated by soils that are not capped by silt, such as Berks and Westmoreland soils. On slopes of more than 8 percent, the plow layer of most cultivated soils contains some subsoil material and has a higher content of clay and a lower content of organic matter because of erosion.

Time

The length of time that the parent material is exposed to the processes of soil formation affects the nature of the soil. Most of the soils on stable residual uplands, such as Gilpin and Lowell soils, are many thousands of years old. Such soils have well expressed horizons. Some recent soils that were deposited in filled valleys are underlain by older sediments in which a soil profile has developed *(6, 15)*. Homewood soils are somewhat young soils that formed in Illinoian-age glacial till. They also have well expressed horizons. The alluvial soils, such as Newark and Nolin soils, are much younger than the Homewood soils and do not show the horizon development of the older soils. The youngest soils in the county are soils that are forming in recent mine spoil, such as Morristown and Bethesda soils. The parent material in some of these soils has been altered to a depth of only 1 inch.

Climate

The climate in Muskingum County is too uniform to have significantly contributed to differences among the soils in the area. Topography and relief, however, can create differences in the microclimate *(20)*. Rain water is lost through runoff on steep slopes, for example, and surface water accumulates in depressions. In steep areas, north- and east-facing slopes are cooler and more moist than south- and west-facing slopes because of the shadow effect.

The entire county has a humid, temperate climate, which is favorable for the growth of hardwood forests. More information about climate is available under the heading "General Nature of the County."

Plants and Animals

Plants and animals have influenced the formation of soils. Most of Muskingum County was once covered by hardwood forests that were dominated by beech, oak, hickory, maple, and ash trees *(18)*. Because these trees are inefficient in returning organic matter to the soil, the soils that formed under forests of such trees are light colored and have less than 3 percent organic matter in the surface layer. Rainfall percolating through the leaf litter produces weak organic acids, which serve as leaching agents as they move downward through the soil. The dense fragipan layer in some soils, such as Homewood and Zanesville soils, may be cemented by silica leached by these acids *(25)*. Tree trunks channel rainfall, creating pockets of intense leaching.

Bacteria and fungi break down the leaf litter. Earthworms also consume large volumes of leaf litter. The burrowing of animals and the downslope slippage of trees mix the soil. Burrows and the channels of decayed roots are passages through which water can move deeper into the soil.

Human activities have had a significant impact on the soils in Muskingum County. The clearing of forests and subsequent farming activities have caused erosion of the original surface soil. As a result, the surface soil has been replaced by a mixture of surface and subsoil material. Strip mining for coal has affected a large acreage in the county. Mining activities have destroyed soils that took centuries to form and have mixed their material with material from far below the surface. As a result, a new type of parent material was created.

Processes of Soil Formation

Soil-forming processes act on parent material over time to produce soils. The nature and rate of these processes are influenced by climate, vegetation, and relief. These processes fall into four general categories—additions, removals, transfers, and transformations.

The most obvious example of additions is the darkening of the surface layer caused by the addition of organic material. When plants die, their remains fall to the surface where they decay to form organic matter. This is one of the earliest processes in soil formation. A darkened layer can be seen on the surface of mine spoil that is only a few years old.

Most removals from the soil involve the action of water. Erosion by water removes several tons of soil per acre each year, even on well managed land *(5, 13)*. Lowell and Upshur soils were originally calcareous throughout. The leaching action of water has removed the calcium carbonate from the upper part of these soils to a depth of 3 or 4 feet. Differences in color are apparently the result of weathering of minerals inherited from the parent material *(19)*.

Transfers also are accomplished to a large extent by water. Water has moved clay from the A and E horizons of some soils, such as Homewood and Westmoreland soils, and deposited it as clay films in the B horizon. In such soils, the A and E horizons contain less clay than the parent material and the B horizon contains more.

Most transformations in the soil involve minerals and are not easily observed. One of the more evident changes involves iron minerals. The occurrence of gray mottles in some soils is the result of the transformation of iron from an oxidized to a reduced state *(3, 4)*. The transformation from rock to soil can be observed in some soils. Rigley, Gilpin, and Westmoreland soils have a Cr horizon, which resembles rock but easily crushes into soil. There are weathered or softened zones in the rock underlying Berks and Gilpin soils. Roots penetrate these zones and break the rock into fine earth *(22)*.

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Glossary

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Argillic horizon. A subsoil horizon characterized by an accumulation of illuvial clay.

Aspect. The direction in which a slope faces.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the total cation-exchange capacity.

Bedding planes. Fine stratifications, less than 5 millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediments.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bedrock-controlled topography. A landscape where the configuration and relief of the landforms are determined or strongly influenced by the underlying bedrock.

Bottom land. The normal flood plain of a stream, subject to flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Catsteps. Very small, irregular terraces on steep hillsides, especially in pasture, formed by the trampling of cattle or the slippage of saturated soil.

Channery soil. A soil that is, by volume, more than 15 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches along the longest axis. A single piece is called a channer.

Chiseling. Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard, compacted layers to a depth below normal plow depth.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Climax vegetation. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Coarse fragments. If round, mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter; if flat, mineral or rock particles (flagstone) 15 to 38 centimeters (6 to 15 inches) long.

Coarse textured soil. Sand or loamy sand.

Cobblestone (or cobble). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Colluvium. Soil material or rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex slope. Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils are somewhat similar in all areas.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are:

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Corrosion. Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Dense layer (in tables). A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

Depth, soil. The depth to bedrock. Deep soils are more than 40 inches deep over bedrock, moderately deep soils are 20 to 40 inches deep over bedrock, and shallow soils are 10 to 20 inches deep over bedrock.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Drainage, surface. Runoff, or surface flow of water, from an area.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, for example, fire, that exposes the surface.

Erosion pavement. A layer of gravel or stones that remains on the surface after fine particles are removed by sheet or rill erosion.

Esker (geology). A narrow, winding ridge of stratified gravelly and sandy drift deposited by a stream flowing in a tunnel beneath a glacier.

Excess fines (in tables). Excess silt and clay in the soil. The soil is not a source of gravel or sand for construction purposes.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Fine textured soil. Sandy clay, silty clay, or clay.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist, 6 to 15 inches (15 to 38 centimeters) long.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Foot slope. The inclined surface at the base of a hill.

Forb. Any herbaceous plant not a grass or a sedge.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Glacial outwash (geology). Gravel, sand, and silt, commonly stratified, deposited by glacial meltwater.

Glacial till (geology). Unsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Glaciofluvial deposits (geology). Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and occur as kames, eskers, deltas, and outwash plains.

Glaciolacustrine deposits. Material ranging from fine clay to sand derived from glaciers and deposited in glacial lakes mainly by glacial meltwater. Many deposits are interbedded or laminated.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors and mottles.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.6 centimeters) in diameter.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water (geology). Water filling all the unblocked pores of the material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric and the more decomposed sapric material.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. The major horizons are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, any plowed or disturbed surface layer.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an O, A, or E horizon. The B horizon is in part a layer of transition from the overlying horizon to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) granular, prismatic, or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying horizon. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Hard, consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon but can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Lacustrine deposit (geology). Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Lamellae. A series of fibers or bands of higher clay content that occur in sands or loess.

Landslide. The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by the wind.

Low strength. The soil is not strong enough to support loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent.* The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium,* from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse,* more than 15 millimeters (about 0.6 inch).

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Outwash plain. A landform of mainly sandy or coarse textured material of glaciofluvial origin. An outwash plain is commonly smooth; where pitted, it is generally low in relief.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan.*

Parent material. The unconsolidated organic and mineral material in which soil forms.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil, adversely affecting the specified use.

Perimeter drain. An artificial drain placed around the perimeter of a septic tank absorption field to lower the water table. Also called a curtain drain.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poor filter (in tables). Because of rapid permeability, the soil may not adequately filter effluent from a waste disposal system.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid	below 3.6
Extremely acid	3.6 to 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rill. A steep-sided channel resulting from accelerated erosion. A rill is generally a few inches deep and not wide enough to be an obstacle to farm machinery.

Rippable. Bedrock or hardpan can be excavated using a single-tooth ripping attachment mounted on a tractor with a 200-300 drawbar horsepower rating.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-sized particles.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slippage (in tables). Soil mass susceptible to movement downslope when loaded, excavated, or wet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5

Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

Stone line. A concentration of coarse fragments in a soil. Generally, it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stripcropping. Growing crops in a systematic arrangement of strips or bands which provide vegetative barriers to soil blowing and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from soil blowing and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Breaking up a compact subsoil by pulling a special chisel through the soil.

Substratum. The part of the soil below the solum.

Subsurface layer. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from about 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Surface soil. The A, E, AB, and EB horizons. It includes all subdivisions of these horizons.

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). A layer of otherwise suitable soil material that is too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

Unstable fill (in tables). Risk of caving or sloughing on banks of fill material.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Valley fill. In glaciated regions, material deposited in stream valleys by glacial meltwater. In nonglaciated regions, alluvium deposited by heavily loaded streams.

Variant, soil. A soil having properties sufficiently different from those of other known soils to justify a new series name, but occurring in such a limited geographic area that creation of a new series is not justified.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Varve. A sedimentary layer of a lamina or sequence of laminae deposited in a body of still water within a year. Specifically, a thin pair of graded glaciolacustrine layers seasonally deposited, usually by meltwater streams, in a glacial lake or other body of still water in front of a glacier.

Water bar. A shallow trench and a mound of earth constructed at an angle across a road or trail to intercept and divert surface runoff and reduce the hazard of erosion.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

(Recorded in the period 1951-86 at Zanesville, Ohio)

Month	Temperature						Precipitation				
				2 years in 10 will have--				2 years in 10 will have--			
	Average daily maximum	Average daily minimum	Average	Maximum temperature higher than--	Minimum temperature lower than--	Average number of growing degree days*	Average	Less than--	More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January-----	35.5	18.5	27.0	64	-10	2	2.43	1.42	3.33	6	7.6
February----	39.6	20.9	30.2	67	-8	4	2.38	1.27	3.35	5	5.4
March-------	49.9	29.4	39.6	78	5	34	3.38	1.97	4.63	7	4.5
April-------	62.6	39.3	51.0	85	20	138	3.60	2.16	4.89	8	.5
May---------	72.6	48.6	60.6	89	28	342	3.77	2.50	4.92	8	.0
June--------	80.5	57.2	68.9	94	39	566	4.16	2.39	5.73	7	.0
July--------	83.7	61.5	72.6	95	46	700	4.44	2.68	6.02	7	.0
August------	82.5	60.0	71.2	95	42	658	3.52	1.66	5.12	6	.0
September---	76.6	52.9	64.8	94	32	445	2.74	1.39	3.91	5	.0
October-----	65.2	41.6	53.4	84	21	170	2.32	1.19	3.32	5	.0
November----	51.6	32.7	42.1	75	10	39	2.98	1.58	4.20	6	1.9
December----	40.3	23.9	32.1	68	-4	9	2.75	1.52	3.84	7	4.6
Yearly:											
Average---	61.7	40.5	51.1	---	---	---	---	---	---	---	---
Extreme---	102	-19	---	97	-12	---	---	---	---	---	---
Total-----	---	---	---	---	---	3,106	38.46	33.80	42.82	77	24.6

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (50 degrees F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

(Recorded in the period 1951-86 at Zanesville, Ohio)

Probability	Temperature		
	24 °F or lower	28 °F or lower	32 °F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	Apr. 21	May 3	May 19
2 years in 10 later than--	Apr. 16	Apr. 29	May 14
5 years in 10 later than--	Apr. 6	Apr. 20	May 4
First freezing temperature in fall:			
1 year in 10 earlier than--	Oct. 19	Oct. 6	Sept. 24
2 years in 10 earlier than--	Oct. 24	Oct. 11	Sept. 28
5 years in 10 earlier than--	Nov. 4	Oct. 22	Oct. 8

TABLE 3.--GROWING SEASON

(Recorded in the period 1951-86 at Zanesville, Ohio)

Probability	Daily minimum temperature during growing season		
	Higher than 24 °F	Higher than 28 °F	Higher than 32 °F
	Days	Days	Days
9 years in 10	190	163	134
8 years in 10	197	171	141
5 years in 10	210	185	155
2 years in 10	223	199	169
1 year in 10	230	207	176

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
AaB	Aaron silt loam, 2 to 8 percent slopes	1,208	0.3
AaC2	Aaron silt loam, 8 to 15 percent slopes, eroded	9,294	2.2
AaD2	Aaron silt loam, 15 to 25 percent slopes, eroded	3,447	0.8
AcB	Aaron-Upshur complex, 2 to 6 percent slopes	522	0.1
AfB	Alford silt loam, 2 to 8 percent slopes	5,325	1.3
AfC2	Alford silt loam, 8 to 15 percent slopes, eroded	5,473	1.3
BeB	Berks channery silt loam, 2 to 8 percent slopes	129	*
BeD2	Berks channery silt loam, 15 to 25 percent slopes, eroded	1,700	0.4
BeE	Berks channery silt loam, 25 to 40 percent slopes	7,642	1.8
BkF	Berks-Westmoreland complex, 40 to 70 percent slopes	20,505	5.0
BoB	Bethesda shaly silt loam, 1 to 15 percent slopes	1,022	0.2
BoD	Bethesda shaly silt loam, 15 to 25 percent slopes	1,384	0.3
BpF	Bethesda flaggy silt loam, 25 to 70 percent slopes	7,495	1.8
BsC2	Brookside silty clay loam, 8 to 15 percent slopes, eroded	735	0.2
BsE	Brookside silty clay loam, 15 to 40 percent slopes	790	0.2
Cb	Chagrin loam, rarely flooded	2,250	0.5
CcA	Chavies loam, 0 to 2 percent slopes	535	0.1
CcB	Chavies loam, 2 to 6 percent slopes	1,018	0.2
CeA	Chili loam, 0 to 3 percent slopes	492	0.1
CeB	Chili loam, 3 to 8 percent slopes	366	0.1
ChA	Chili gravelly loam, 0 to 3 percent slopes	980	0.2
ChB	Chili gravelly loam, 3 to 8 percent slopes	562	0.1
ChC	Chili gravelly loam, 8 to 15 percent slopes	323	0.1
CkA	Cidermill silt loam, 0 to 3 percent slopes	1,196	0.3
CnB	Cincinnati silt loam, 2 to 6 percent slopes	510	0.1
CnC2	Cincinnati silt loam, 6 to 15 percent slopes, eroded	1,687	0.4
CpC2	Clarksburg silt loam, 8 to 15 percent slopes, eroded	663	0.2
CrC	Claysville-Guernsey silty clay loams, 8 to 15 percent slopes	845	0.2
CsC2	Coshocton silt loam, 8 to 15 percent slopes, eroded	10,336	2.5
CsD	Coshocton silt loam, 15 to 25 percent slopes	18,843	4.5
CtE	Coshocton-Westmoreland silt loams, 25 to 40 percent slopes	18,882	4.5
Ds	Dumps and Pits, mine	425	0.1
FaB	Fairpoint silty clay loam, 1 to 15 percent slopes	4,741	1.1
FaD	Fairpoint silty clay loam, 15 to 25 percent slopes	5,621	1.3
FaE	Fairpoint silty clay loam, 25 to 50 percent slopes	1,278	0.3
FbF	Fairpoint channery silty clay loam, 25 to 70 percent slopes	2,390	0.6
FcA	Fitchville silt loam, 0 to 2 percent slopes	3,612	0.9
FcB	Fitchville silt loam, 2 to 6 percent slopes	1,586	0.4
FkB	Frankstown Variant-Mertz complex, 3 to 8 percent slopes	313	0.1
GdB	Gilpin silt loam, 2 to 8 percent slopes	2,035	0.5
GdC2	Gilpin silt loam, 8 to 15 percent slopes, eroded	10,041	2.4
GeD2	Gilpin-Upshur complex, 15 to 25 percent slopes, eroded	458	0.1
GeE2	Gilpin-Upshur complex, 25 to 40 percent slopes, eroded	1,415	0.3
GfA	Glenford silt loam, 0 to 2 percent slopes	1,423	0.3
GfB	Glenford silt loam, 2 to 6 percent slopes	6,803	1.6
GfC2	Glenford silt loam, 6 to 15 percent slopes, eroded	4,377	1.1
GtC2	Guernsey-Upshur silty clay loams, 6 to 15 percent slopes, eroded	11,696	2.8
GtD2	Guernsey-Upshur silty clay loams, 15 to 25 percent slopes, eroded	7,290	1.7
HaC2	Homewood silt loam, 8 to 15 percent slopes, eroded	322	0.1
HaD2	Homewood silt loam, 15 to 20 percent slopes, eroded	473	0.1
JtA	Jimtown loam, 0 to 3 percent slopes	249	0.1
KeB	Keene silt loam, 2 to 6 percent slopes	5,675	1.4
KeC2	Keene silt loam, 6 to 15 percent slopes, eroded	7,196	1.7
Km	Killbuck silt loam, occasionally flooded	240	0.1
LaC	Lakin loamy fine sand, 8 to 15 percent slopes	215	0.1
LcD	Lakin-Alford complex, 15 to 25 percent slopes	535	0.1
Lk	Lindside silt loam, occasionally flooded	4,883	1.2
Lm	Lobdell loam, channery substratum, occasionally flooded	2,681	0.6
Lo	Lorain silty clay	889	0.2
LpC2	Lowell silt loam, 8 to 15 percent slopes, eroded	3,487	0.8
LpD2	Lowell silt loam, 15 to 25 percent slopes, eroded	5,612	1.3
LrE2	Lowell-Gilpin complex, 25 to 40 percent slopes, eroded	8,154	2.0
LrF	Lowell-Gilpin complex, 40 to 70 percent slopes	1,300	0.3

See footnote at end of table.

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

Map symbol	Soil name	Acres	Percent
Lu	Luray silty clay loam	535	0.1
MaB	Markland silt loam, 2 to 6 percent slopes	1,300	0.3
MbC2	Markland silty clay loam, 6 to 15 percent slopes, eroded	1,490	0.4
McD2	Markland-Glenford complex, 15 to 35 percent slopes, eroded	1,894	0.5
MdA	McGary silt loam, 0 to 3 percent slopes	755	0.2
Me	Melvin silt loam, frequently flooded	4,800	1.2
MkD	Mertz very cherty silt loam, 15 to 35 percent slopes	660	0.2
MrB	Morristown shaly silty clay loam, 1 to 15 percent slopes	476	0.1
MrD	Morristown shaly silty clay loam, 15 to 25 percent slopes	340	0.1
MrF	Morristown shaly silty clay loam, 25 to 70 percent slopes	3,016	0.7
MsB	Morristown silty clay loam, 1 to 8 percent slopes	2,202	0.5
MsC	Morristown silty clay loam, 8 to 15 percent slopes	2,264	0.5
MsD	Morristown silty clay loam, 15 to 25 percent slopes	3,801	0.9
MsE	Morristown silty clay loam, 25 to 50 percent slopes	1,158	0.3
Ne	Newark silt loam, frequently flooded	9,690	2.3
No	Nolin silt loam, occasionally flooded	4,578	1.1
OmB	Omulga silt loam, 2 to 6 percent slopes	1,005	0.2
OmC	Omulga silt loam, 6 to 15 percent slopes	1,552	0.4
RaB	Rawson silt loam, 2 to 6 percent slopes	1,717	0.4
RfC	Rigley loam, 8 to 15 percent slopes	3,973	1.0
RgD	Rigley channery loam, 15 to 25 percent slopes	8,228	2.0
RhE	Rigley-Coshocton complex, 25 to 40 percent slopes	8,557	2.1
RoF	Rodman gravelly sandy loam, 25 to 70 percent slopes	631	0.2
Se	Sebring silt loam	2,622	0.6
St	Stonelick loam, occasionally flooded	339	0.1
Ta	Tioga fine sandy loam, rarely flooded	2,242	0.5
Tf	Tioga fine sandy loam, occasionally flooded	1,536	0.4
Ud	Udorthents, loamy, hilly	2,564	0.6
Ug	Udorthents, sandy, rolling	265	0.1
Uh	Udorthents, sandy-skeletal, steep	553	0.1
Uk	Udorthents-Pits complex	830	0.2
UsB	Urban land-Glenford complex, 2 to 8 percent slopes	970	0.2
UtA	Urban land-Nolin complex, rarely flooded	586	0.2
UvB	Urban land-Watertown complex, 1 to 15 percent slopes	1,465	0.4
UwC	Urban land-Wellston complex, 5 to 15 percent slopes	1,126	0.3
WaB	Watertown sandy loam, 1 to 8 percent slopes	1,974	0.5
WaC	Watertown sandy loam, 8 to 15 percent slopes	478	0.1
WhB	Wellston silt loam, 2 to 8 percent slopes	3,138	0.8
WhC2	Wellston silt loam, 8 to 15 percent slopes, eroded	10,631	2.6
WmB	Westgate silt loam, 2 to 6 percent slopes	1,365	0.3
WmC2	Westgate silt loam, 6 to 15 percent slopes, eroded	5,027	1.2
WtC2	Westmoreland silt loam, 8 to 15 percent slopes, eroded	3,408	0.8
WtD2	Westmoreland silt loam, 15 to 25 percent slopes, eroded	21,229	5.2
WtE	Westmoreland silt loam, 25 to 40 percent slopes	14,489	3.5
WuC2	Westmoreland-Guernsey silt loams, 8 to 15 percent slopes, eroded	998	0.2
WuD2	Westmoreland-Guernsey silt loams, 15 to 25 percent slopes, eroded	12,340	3.0
WuE2	Westmoreland-Guernsey silt loams, 25 to 40 percent slopes, eroded	10,403	2.5
WvD	Westmoreland-Urban land complex, 15 to 35 percent slopes	514	0.1
ZnB	Zanesville silt loam, 2 to 6 percent slopes	7,533	1.8
ZnC2	Zanesville silt loam, 6 to 15 percent slopes, eroded	6,451	1.5
	Water	3,368	0.8
	Total	416,640	100.0

* Less than 0.1 percent.

TABLE 5.--PRIME FARMLAND

(Only the soils considered prime farmland are listed. Urban or built-up areas of the soils listed are not considered prime farmland. If a soil is prime farmland only under certain conditions, the conditions are specified in parentheses after the soil name)

Map symbol	Soil name
AaB	Aaron silt loam, 2 to 8 percent slopes
AcB	Aaron-Upshur complex, 2 to 6 percent slopes
AfB	Alford silt loam, 2 to 8 percent slopes
Cb	Chagrin loam, rarely flooded
CcA	Chavies loam, 0 to 2 percent slopes
CcB	Chavies loam, 2 to 6 percent slopes
CeA	Chili loam, 0 to 3 percent slopes
CeB	Chili loam, 3 to 8 percent slopes
ChA	Chili gravelly loam, 0 to 3 percent slopes
ChB	Chili gravelly loam, 3 to 8 percent slopes
CkA	Cidermill silt loam, 0 to 3 percent slopes
CnB	Cincinnati silt loam, 2 to 6 percent slopes
FcA	Fitchville silt loam, 0 to 2 percent slopes (where drained)
FcB	Fitchville silt loam, 2 to 6 percent slopes (where drained)
GdB	Gilpin silt loam, 2 to 8 percent slopes
GfA	Glenford silt loam, 0 to 2 percent slopes
GfB	Glenford silt loam, 2 to 6 percent slopes
JtA	Jimtown loam, 0 to 3 percent slopes (where drained)
KeB	Keene silt loam, 2 to 6 percent slopes
Km	Killbuck silt loam, occasionally flooded (where drained)
Lk	Lindside silt loam, occasionally flooded
Lm	Lobdell loam, channery substratum, occasionally flooded
Lo	Lorain silty clay (where drained)
Lu	Luray silty clay loam (where drained)
MaB	Markland silt loam, 2 to 6 percent slopes
MdA	McGary silt loam, 0 to 3 percent slopes (where drained)
Me	Melvin silt loam, frequently flooded (where drained and either protected from flooding or not frequently flooded during the growing season)
Ne	Newark silt loam, frequently flooded (where drained and either protected from flooding or not frequently flooded during the growing season)
No	Nolin silt loam, occasionally flooded
OmB	Omulga silt loam, 2 to 6 percent slopes
RaB	Rawson silt loam, 2 to 6 percent slopes
Se	Sebring silt loam (where drained)
St	Stonelick loam, occasionally flooded
Ta	Tioga fine sandy loam, rarely flooded
Tf	Tioga fine sandy loam, occasionally flooded
WhB	Wellston silt loam, 2 to 8 percent slopes
WmB	Westgate silt loam, 2 to 6 percent slopes
ZnB	Zanesville silt loam, 2 to 6 percent slopes

TABLE 6.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE

(Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)

Soil name and map symbol	Land capability	Corn	Winter wheat	Alfalfa hay	Orchardgrass-alfalfa hay	Bluegrass-ladino	Kentucky bluegrass*
		Bu	Bu	Tons	Tons	AUM**	AUM**
AaB Aaron	IIe	115	46	4.5	4.0	4.5	4.5
AaC2 Aaron	IIIe	100	40	4.0	3.5	3.5	4.5
AaD2 Aaron	IVe	85	34	3.5	3.0	3.0	4.0
AcB Aaron-Upshur	IIe	110	44	4.5	4.0	4.0	4.5
AfB Alford	IIe	135	54	5.8	5.3	5.5	4.5
AfC2 Alford	IIIe	125	50	5.0	4.5	4.5	4.5
BeB Berks	IIe	95	38	3.8	3.3	3.5	3.0
BeD2 Berks	IVe	75	30	3.0	2.5	2.5	3.0
BeE Berks	VIe	---	---	---	---	---	2.0
BkF Berks-Westmoreland	VIIe	---	---	---	---	---	---
BoB, BoD Bethesda	VIs	---	---	---	---	---	1.0
BpF Bethesda	VIIe	---	---	---	---	---	---
BsC2 Brookside	IIIe	105	42	4.0	3.5	4.0	4.0
BsE Brookside	VIe	---	---	---	---	---	2.0
Cb Chagrin	I	140	56	6.0	5.5	5.5	5.0
CcA Chavies	I	130	52	5.6	5.1	5.0	4.0
CcB Chavies	IIe	125	50	5.6	5.1	5.0	4.0
CeA Chili	IIs	120	48	5.2	4.7	4.5	4.0
CeB Chili	IIe	115	46	5.2	4.7	4.5	4.0

See footnotes at end of table.

TABLE 6.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Winter wheat	Alfalfa hay	Orchardgrass-alfalfa hay	Bluegrass-ladino	Kentucky bluegrass*
		Bu	Bu	Tons	Tons	AUM**	AUM**
ChA------------- Chili	IIs	100	40	4.5	4.0	3.5	4.0
ChB------------- Chili	IIe	100	40	4.5	4.0	3.5	4.0
ChC------------- Chili	IIIe	90	36	4.0	3.5	3.0	4.0
CkA------------- Cidermill	I	140	56	6.0	5.5	5.5	4.0
CnB------------- Cincinnati	IIe	120	48	5.0	4.5	4.5	4.0
CnC2------------ Cincinnati	IIIe	110	44	4.5	4.0	4.0	4.0
CpC2------------ Clarksburg	IIIe	110	44	4.5	4.0	4.0	4.0
CrC------------- Claysville-Guernsey	IIIw	90	36	3.5	3.5	3.5	4.0
CsC2------------ Coshocton	IIIe	105	42	4.5	4.0	4.0	4.5
CsD------------- Coshocton	IVe	90	36	3.5	3.0	3.0	4.0
CtE------------- Coshocton-Westmoreland	VIe	---	---	---	---	---	2.0
Ds. Dumps and Pits							
FaB------------- Fairpoint	IIIs	80	32	3.5	3.0	3.0	2.0
FaD------------- Fairpoint	IVs	---	24	2.5	2.0	2.0	2.0
FaE------------- Fairpoint	VIe	---	---	---	---	---	1.0
FbF------------- Fairpoint	VIIe	---	---	---	---	---	---
FcA------------- Fitchville	IIw	120	48	4.5	4.5	4.5	4.0
FcB------------- Fitchville	IIe	115	46	4.5	4.5	4.5	4.0
FkB------------- Frankstown Variant-Mertz	IIe	100	40	4.0	3.5	3.5	3.0

See footnotes at end of table.

TABLE 6.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Winter wheat	Alfalfa hay	Orchardgrass-alfalfa hay	Bluegrass-ladino	Kentucky bluegrass*
		Bu	Bu	Tons	Tons	AUM**	AUM**
GdB------------- Gilpin	IIe	100	40	4.0	3.5	3.5	3.0
GdC2------------ Gilpin	IIIe	95	38	3.8	3.3	3.5	3.0
GeD2------------ Gilpin-Upshur	IVe	---	---	3.5	3.0	2.5	3.0
GeE2------------ Gilpin-Upshur	VIe	---	---	---	---	---	2.0
GfA------------- Glenford	I	125	50	5.0	4.5	4.5	4.5
GfB------------- Glenford	IIe	120	48	4.8	4.3	4.5	4.5
GfC2------------ Glenford	IIIe	110	44	4.5	4.0	4.0	4.5
GtC2------------ Guernsey-Upshur	IVe	95	38	4.0	3.5	3.5	4.5
GtD2------------ Guernsey-Upshur	VIe	---	---	3.0	2.5	2.5	4.0
HaC2------------ Homewood	IIIe	105	44	4.5	4.0	4.0	4.0
HaD2------------ Homewood	IVe	90	36	3.5	3.0	3.0	4.0
JtA------------- Jimtown	IIw	110	44	4.5	4.0	4.0	4.0
KeB------------- Keene	IIe	120	48	4.8	4.3	4.5	4.5
KeC2------------ Keene	IIIe	110	44	4.5	4.0	4.0	4.5
Km-------------- Killbuck	IIIw	110	33	3.8	4.0	3.0	4.0
LaC------------- Lakin	IVs	80	36	4.0	3.5	3.0	3.0
LcD------------- Lakin-Alford	IVe	---	32	3.5	3.0	2.5	3.0
Lk-------------- Lindside	IIw	140	42	5.0	4.5	5.5	5.0
Lm-------------- Lobdell	IIw	120	40	4.8	4.3	5.5	5.0

See footnotes at end of table.

TABLE 6.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Winter wheat	Alfalfa hay	Orchardgrass-alfalfa hay	Bluegrass-ladino	Kentucky bluegrass*
		Bu	Bu	Tons	Tons	AUM**	AUM**
Lo Lorain	IIIw	100	30	3.5	3.5	2.5	4.0
LpC2 Lowell	IIIe	110	44	4.5	4.0	4.0	4.0
LpD2 Lowell	IVe	90	36	3.5	3.0	3.5	4.0
LrE2 Lowell-Gilpin	VIe	---	---	---	---	---	2.0
LrF Lowell-Gilpin	VIIe	---	---	---	---	---	---
Lu Luray	IIw	140	49	4.5	4.5	3.5	4.0
MaB Markland	IIIe	110	44	4.5	4.0	---	4.0
MbC2 Markland	IVe	95	38	4.0	3.5	3.5	4.0
McD2 Markland-Glenford	VIe	---	---	3.5	3.0	2.5	4.0
MdA McGary	IIIw	100	40	3.5	3.5	3.5	4.0
Me Melvin	IIIw	90	---	---	3.6	3.0	4.0
MkD Mertz	VIe	---	---	---	---	---	2.0
MrB, MrD Morristown	VIs	---	---	---	---	---	1.0
MrF Morristown	VIIe	---	---	---	---	---	---
MsB Morristown	IIIs	75	30	3.0	3.0	2.5	2.0
MsC Morristown	IVs	65	26	3.0	3.0	2.5	2.0
MsD Morristown	IVs	---	---	2.5	2.0	2.0	2.0
MsE Morristown	VIe	---	---	---	---	---	1.0
Ne Newark	IIw	110	33	4.5	4.5	3.5	4.0

See footnotes at end of table.

TABLE 6.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Winter wheat	Alfalfa hay	Orchardgrass-alfalfa hay	Bluegrass-ladino	Kentucky bluegrass*
		Bu	Bu	Tons	Tons	AUM**	AUM**
No-------------- Nolin	IIw	140	42	5.0	4.5	5.0	5.0
OmB------------- Omulga	IIe	115	46	---	4.5	4.0	4.0
OmC------------- Omulga	IIIe	105	42	---	4.5	4.0	4.0
RaB------------- Rawson	IIe	120	49	---	4.8	4.3	4.0
RfC------------- Rigley	IIIe	90	36	3.8	3.3	3.0	4.0
RgD------------- Rigley	IVe	80	32	3.5	3.0	2.5	4.0
RhE------------- Rigley-Coshocton	VIe	---	---	---	---	---	2.0
RoF------------- Rodman	VIIs	---	---	---	---	---	---
Se-------------- Sebring	IIIw	110	33	3.8	4.0	3.0	4.0
St-------------- Stonelick	IIw	100	35	---	3.5	3.5	5.0
Ta-------------- Tioga	IIs	120	48	5.0	4.5	4.5	5.0
Tf-------------- Tioga	IIw	120	40	4.8	4.3	4.5	5.0
Ud, Ug, Uh. Udorthents							
Uk. Udorthents-Pits							
UsB. Urban land-Glenford							
UtA. Urban land-Nolin							
UvB. Urban land-Watertown							
UwC. Urban land-Wellston							

See footnotes at end of table.

TABLE 6.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Winter wheat	Alfalfa hay	Orchardgrass-alfalfa hay	Bluegrass-ladino	Kentucky bluegrass*
		Bu	Bu	Tons	Tons	AUM**	AUM**
WaB------------- Watertown	IIIs	100	40	4.3	3.8	3.5	3.0
WaC------------- Watertown	IIIe	90	36	3.9	3.4	3.0	3.0
WhB------------- Wellston	IIe	120	48	5.0	4.5	4.5	4.5
WhC2------------ Wellston	IIIe	110	44	4.5	4.0	4.0	4.5
WmB------------- Westgate	IIe	120	48	4.8	4.3	4.5	4.5
WmC2------------ Westgate	IIIe	110	44	4.5	4.0	4.0	4.5
WtC2------------ Westmoreland	IIIe	105	42	4.5	4.0	4.0	4.0
WtD2------------ Westmoreland	IVe	100	40	4.0	3.5	3.5	4.0
WtE------------- Westmoreland	VIe	---	---	---	---	---	2.0
WuC2------------ Westmoreland-Guernsey	IIIe	105	42	4.5	4.0	4.0	4.0
WuD2------------ Westmoreland-Guernsey	IVe	90	36	3.5	3.0	3.0	4.0
WuE2------------ Westmoreland-Guernsey	VIe	---	---	---	---	---	2.0
WvD. Westmoreland-Urban land							
ZnB------------- Zanesville	IIe	120	48	4.8	4.3	4.5	4.0
ZnC2------------ Zanesville	IIIe	105	42	4.5	4.0	4.0	4.0

* Yields of bluegrass pasture are based on management that includes mowing to control weeds and brush, applying lime, and adding manure. Improved drainage or additions of fertilizer are not included.

** Animal unit month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

TABLE 7.--CAPABILITY CLASSES AND SUBCLASSES

(Miscellaneous areas are excluded. Absence of an entry indicates no acreage)

Class	Total acreage	Major management concerns (Subclass)		
		Erosion (e)	Wetness (w)	Soil problem (s)
		Acres	Acres	Acres
I	5,404	---	---	---
II	72,627	40,810	28,103	3,714
III	106,820	87,752	10,151	8,917
IV	97,952	86,051	---	11,901
V	---	---	---	---
VI	85,834	82,612	---	3,222
VII	35,337	34,706	---	631
VIII	---	---	---	---

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY

(Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available)

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Volume*	
AaB, AaC2 Aaron	4C	Slight	Slight	Slight	Severe	Black oak	85	65	Northern red oak, white oak, white ash, yellow-poplar, eastern white pine.
						White ash	76	75	
						Black locust	78	---	
						Hickory	---	---	
						Sugar maple	---	---	
						Northern red oak	---	---	
						Black walnut	---	---	
AaD2 Aaron (north aspect)	4R	Moderate	Slight	Slight	Severe	Black oak	85	65	Northern red oak, white oak, white ash, yellow-poplar, eastern white pine.
						White ash	76	75	
						Black locust	78	---	
						Hickory	---	---	
						Sugar maple	---	---	
						Northern red oak	---	---	
						Black walnut	---	---	
AaD2 Aaron (south aspect)	4R	Moderate	Moderate	Slight	Severe	Black oak	77	59	Northern red oak, white oak, white ash, Virginia pine.
						White ash	68	63	
						Chinkapin oak	---	---	
						Sugar maple	---	---	
						Black locust	---	---	
AcB:									
Aaron	4C	Slight	Slight	Slight	Severe	Black oak	85	65	Northern red oak, white oak, white ash, yellow-poplar, eastern white pine.
						White ash	76	75	
						Black locust	78	---	
						Hickory	---	---	
						Sugar maple	---	---	
						Northern red oak	---	---	
						Black walnut	---	---	
Upshur	3C	Slight	Slight	Slight	Moderate	Northern red oak	65	48	Eastern white pine, shortleaf pine, yellow-poplar.
						Yellow-poplar	80	71	
						Eastern white pine	80	181	
AfB, AfC2 Alford	5A	Slight	Slight	Slight	Moderate	White oak	90	72	Eastern white pine, red pine, black walnut, yellow-poplar, white ash, black locust.
						Yellow-poplar	98	102	
BeB Berks	4F	Slight	Moderate	Slight	Slight	Northern red oak	70	52	Eastern white pine, Japanese larch, Norway spruce, red pine.
						Black oak	70	52	

See footnote at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Volume*	
BeD2------------ Berks (north aspect)	4R	Moderate	Moderate	Slight	Slight	Northern red oak---- Black oak-----------	70 70	52 52	Eastern white pine, Japanese larch, Norway spruce, red pine.
BeD2------------ Berks (south aspect)	3R	Moderate	Moderate	Slight	Slight	Northern red oak---- Black oak-----------	60 60	43 43	Eastern white pine, Japanese larch, Norway spruce, red pine.
BeE------------- Berks (north aspect)	4R	Moderate	Moderate	Slight	Slight	Northern red oak---- Black oak-----------	70 70	52 52	Eastern white pine, Japanese larch, Norway spruce, red pine.
BeE------------- Berks (south aspect)	3R	Moderate	Moderate	Slight	Slight	Northern red oak---- Black oak-----------	60 60	43 43	Eastern white pine, Japanese larch, Norway spruce, red pine.
BkF: Berks (north aspect)-------	4R	Severe	Moderate	Slight	Slight	Northern red oak---- Black oak-----------	70 70	52 52	Eastern white pine, Japanese larch, Norway spruce, red pine.
Westmoreland (north aspect)	4R	Severe	Slight	Slight	Severe	Northern red oak---- Yellow-poplar------- Eastern white pine--	81 90 75	63 90 166	Black walnut, yellow-poplar, eastern white pine.
BkF: Berks (south aspect)-------	3R	Severe	Severe	Slight	Slight	Northern red oak---- Black oak-----------	60 60	43 43	Eastern white pine, Japanese larch, Norway spruce, red pine.
Westmoreland (south aspect)	4R	Severe	Slight	Slight	Severe	Northern red oak---- Yellow-poplar------- Eastern white pine--	70 80 65	52 71 136	Eastern white pine, European larch.
BoB, BoD, BpF--- Bethesda	---	---	---	---	---	---	---	---	Eastern white pine, red pine, black locust.

See footnote at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Volume*	
BsC2: Brookside	5A	Slight	Slight	Slight	Moderate	Northern red oak	86	68	Eastern white pine, black walnut, yellow-poplar, white ash, red pine, northern red oak, white oak.
						Yellow-poplar	96	100	
						White oak	---	---	
						Black walnut	---	---	
						Black cherry	---	---	
						Sugar maple	---	---	
						White ash	---	---	
BsE: Brookside (north aspect)	5R	Moderate	Slight	Slight	Moderate	Northern red oak	86	68	Eastern white pine, black walnut, yellow-poplar, white ash, red pine, northern red oak, white oak.
						Yellow-poplar	96	100	
						White oak	---	---	
						Black walnut	---	---	
						Black cherry	---	---	
						Sugar maple	---	---	
						White ash	---	---	
BsE: Brookside (south aspect)	4R	Moderate	Moderate	Slight	Moderate	Northern red oak	80	62	Eastern white pine, red pine, yellow-poplar, black walnut, white ash, northern red oak, white oak.
						White oak	75	57	
						Black walnut	---	---	
						Black cherry	---	---	
						Sugar maple	---	---	
						White ash	---	---	
						Yellow-poplar	---	---	
Cb: Chagrin	5A	Slight	Slight	Slight	Severe	Northern red oak	86	68	Eastern white pine, black walnut, yellow-poplar, white ash, red pine, northern red oak, white oak.
						Yellow-poplar	96	100	
						Sugar maple	86	53	
						White oak	---	---	
						Black cherry	---	---	
						White ash	---	---	
						Black walnut	---	---	
CcA, CcB: Chavies	4A	Slight	Slight	Slight	Moderate	Northern red oak	80	62	Eastern white pine, yellow-poplar, black walnut, northern red oak, white oak.
						Yellow-poplar	93	95	
						Black walnut	---	---	
						Black cherry	---	---	
						Sugar maple	---	---	
						Red maple	---	---	
						Hickory	---	---	
						White oak	---	---	
						American sycamore	---	---	
CeA, CeB, ChA, ChB, ChC: Chili	4A	Slight	Slight	Slight	Moderate	White oak	80	62	Eastern white pine, red pine, black walnut, yellow-poplar, white ash, northern red oak, white oak, green ash, black cherry, black locust.
						Northern red oak	85	67	
						Black walnut	---	---	
						Black cherry	---	---	
						Sugar maple	---	---	
						White ash	---	---	
						Yellow-poplar	---	---	

See footnote at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Volume*	
CkA Cidermill	5A	Slight	Slight	Slight	Severe	White oak	85	67	Eastern white pine, red pine, black walnut, yellow-poplar, white ash, northern red oak, white oak, green ash, black cherry, black locust.
						Northern red oak	90	72	
						Black walnut	---	---	
						Black cherry	---	---	
						Sugar maple	---	---	
						White ash	---	---	
						Yellow-poplar	---	---	
CnB, CnC2 Cincinnati	4A	Slight	Slight	Moderate	Severe	Northern red oak	80	62	Eastern white pine, black walnut, yellow-poplar, white ash, red pine, northern red oak, white oak.
						White oak	---	---	
						Black walnut	---	---	
						Black cherry	---	---	
						Sugar maple	---	---	
						White ash	---	---	
						Yellow-poplar	---	---	
CpC2 Clarksburg	4A	Slight	Slight	Slight	Moderate	Northern red oak	75	57	Eastern white pine, yellow-poplar, Japanese larch.
						Yellow-poplar	85	81	
CrC: Claysville.									
Guernsey	4A	Slight	Slight	Slight	Severe	Northern red oak	78	60	Eastern white pine, yellow-poplar, green ash, white ash, red pine, white oak, northern red oak.
						Yellow-poplar	95	98	
						Sugar maple	---	---	
						White ash	---	---	
						White oak	---	---	
						Black cherry	---	---	
CsC2 Coshocton	4A	Slight	Slight	Slight	Severe	Northern red oak	80	62	Eastern white pine, yellow-poplar, northern red oak, white oak, red pine, white ash.
						White oak	75	57	
						Yellow-poplar	90	90	
						White ash	---	---	
						Sugar maple	---	---	
						Black cherry	---	---	
CsD Coshocton (north aspect)	4R	Moderate	Slight	Slight	Severe	Northern red oak	80	62	Eastern white pine, yellow-poplar, northern red oak, white oak, red pine, white ash.
						White oak	75	57	
						Yellow-poplar	90	90	
						White ash	---	---	
						Sugar maple	---	---	
						Black cherry	---	---	

See footnote at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume*	Trees to plant
CsD------------- Coshocton (south aspect)	3R	Moderate	Moderate	Slight	Severe	White oak----------- Northern red oak---- Yellow-poplar------- White ash----------- Sugar maple--------- Black cherry--------	65 --- --- --- --- ---	48 --- --- --- --- ---	Eastern white pine, yellow-poplar, northern red oak, white oak, white ash, red pine.
CtE:									
Coshocton (north aspect)	4R	Moderate	Slight	Slight	Severe	Northern red oak---- White oak----------- Yellow-poplar------- White ash----------- Sugar maple--------- Black cherry--------	80 75 90 --- --- ---	62 57 90 --- --- ---	Eastern white pine, yellow-poplar, northern red oak, white oak, red pine, white ash.
Westmoreland (north aspect)	4R	Moderate	Slight	Slight	Severe	Northern red oak---- Yellow-poplar------- Eastern white pine--	81 90 75	63 90 166	Black walnut, yellow-poplar, eastern white pine.
CtE:									
Coshocton (south aspect)	3R	Moderate	Moderate	Slight	Severe	White oak----------- Northern red oak---- Yellow-poplar------- White ash----------- Sugar maple--------- Black cherry--------	65 --- --- --- --- ---	48 --- --- --- --- ---	Eastern white pine, yellow-poplar, northern red oak, white oak, white ash, red pine.
Westmoreland (south aspect)	4R	Moderate	Slight	Slight	Severe	Northern red oak---- Yellow-poplar------- Eastern white pine--	70 80 65	52 71 136	Eastern white pine, European larch.
FaB, FaD, FaE--- Fairpoint	---	---	---	---	---	---	---	---	Eastern white pine, black locust, yellow-poplar.
FcA, FcB-------- Fitchville	5A	Slight	Slight	Slight	Severe	Pin oak------------- Northern red oak---- Yellow-poplar------- Sugar maple---------	90 80 --- ---	72 62 --- ---	Eastern white pine, white ash, green ash, yellow-poplar, red pine, white oak, northern red oak, black cherry, black locust.

See footnote at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Volume*	
FkB: Frankstown Variant-------	4D	Slight	Slight	Moderate	Moderate	Northern red oak----	80	62	Eastern white pine, yellow-poplar, red pine, white ash, black oak.
						White oak-----------	---	---	
						White ash-----------	---	---	
						Slippery elm--------	---	---	
						American beech------	---	---	
						Sugar maple---------	---	---	
						American sycamore---	---	---	
Mertz----------	4F	Slight	Moderate	Slight	Severe	Northern red oak----	80	62	Yellow-poplar, eastern white pine, Japanese larch, Norway spruce.
						Yellow-poplar-------	90	90	
GdB, GdC2------- Gilpin	4A	Slight	Slight	Slight	Moderate	Northern red oak----	80	62	Japanese larch, Virginia pine, eastern white pine, black cherry, yellow-poplar.
						Yellow-poplar-------	95	98	
GeD2: Gilpin (north aspect)-------	4R	Moderate	Slight	Slight	Moderate	Northern red oak----	80	62	Japanese larch, eastern white pine, black cherry, yellow-poplar.
						Yellow-poplar-------	95	98	
Upshur (north aspect)-------	4R	Moderate	Severe	Severe	Moderate	Northern red oak----	70	52	Eastern white pine, shortleaf pine, yellow-poplar.
						Yellow-poplar-------	90	90	
						Eastern white pine--	90	211	
GeD2: Gilpin (south aspect)-------	4R	Moderate	Moderate	Slight	Moderate	Northern red oak----	70	52	Japanese larch, eastern white pine, black cherry, yellow-poplar.
						Yellow-poplar-------	90	90	
Upshur (south aspect)-------	3R	Moderate	Severe	Severe	Moderate	Northern red oak----	65	48	Eastern white pine, shortleaf pine, eastern redcedar.
						Eastern white pine--	75	166	
GeE2: Gilpin (north aspect)-------	4R	Moderate	Slight	Slight	Moderate	Northern red oak----	80	62	Japanese larch, eastern white pine, black cherry, yellow-poplar.
						Yellow-poplar-------	95	98	

See footnote at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Volume*	
GeE2: Upshur (north aspect)	4R	Moderate	Severe	Severe	Moderate	Northern red oak	70	52	Eastern white pine, shortleaf pine, yellow-poplar.
						Yellow-poplar	90	90	
						Eastern white pine	90	211	
GeE2: Gilpin (south aspect)	4R	Moderate	Moderate	Slight	Moderate	Northern red oak	70	52	Japanese larch, eastern white pine, black cherry, yellow-poplar.
						Yellow-poplar	90	90	
Upshur (south aspect)	3R	Moderate	Severe	Severe	Moderate	Northern red oak	65	48	Eastern white pine, shortleaf pine, eastern redcedar.
						Eastern white pine	75	166	
GfA, GfB, GfC2-- Glenford	5A	Slight	Slight	Slight	Severe	Northern red oak	86	68	Eastern white pine, red pine, yellow-poplar, green ash, white ash, white oak, northern red oak, black cherry, black locust.
						Yellow-poplar	96	100	
						White oak	---	---	
						White ash	---	---	
						Black cherry	---	---	
						Sugar maple	---	---	
GtC2: Guernsey	4A	Slight	Slight	Slight	Severe	Northern red oak	78	60	Eastern white pine, yellow-poplar, green ash, white ash, red pine, white oak, northern red oak.
						Yellow-poplar	95	48	
						Sugar maple	---	---	
						White ash	---	---	
						White oak	---	---	
						Black cherry	---	---	
Upshur	3C	Slight	Severe	Severe	Moderate	Northern red oak	65	48	Eastern white pine, yellow-poplar.
						Yellow-poplar	80	71	
						Eastern white pine	80	181	
GtD2: Guernsey (north aspect)	4R	Moderate	Slight	Slight	Severe	Northern red oak	78	60	Eastern white pine, yellow-poplar, green ash, white ash, red pine, white oak, northern red oak.
						Yellow-poplar	95	98	
						Sugar maple	---	---	
						White ash	---	---	
						White oak	---	---	
						Black cherry	---	---	

See footnote at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Volume*	
GtD2: Upshur (north aspect)	4R	Moderate	Severe	Severe	Moderate	Northern red oak	70	52	Eastern white pine, yellow-poplar.
						Yellow-poplar	90	90	
						Eastern white pine	90	211	
GtD2: Guernsey (south aspect)	4R	Moderate	Moderate	Slight	Severe	Northern red oak	70	52	White oak, yellow-poplar, white ash, northern red oak, eastern white pine, red pine.
						White oak	65	48	
						Black cherry	---	---	
						Sugar maple	---	---	
						White ash	---	---	
						Yellow-poplar	---	---	
Upshur (south aspect)	3R	Moderate	Severe	Severe	Moderate	Northern red oak	65	48	Eastern white pine, eastern redcedar.
						Eastern white pine	75	166	
HaC2 Homewood	5D	Slight	Slight	Moderate	Moderate	Northern red oak	93	75	Black oak, yellow-poplar, red pine, white ash, eastern white pine.
						White oak	---	---	
						Slippery elm	---	---	
						American beech	---	---	
						Sugar maple	---	---	
						White ash	---	---	
						American sycamore	---	---	
HaD2 Homewood (north aspect)	5R	Moderate	Slight	Moderate	Moderate	Northern red oak	93	75	Black oak, yellow-poplar, red pine, white ash, eastern white pine.
						White oak	---	---	
						Slippery elm	---	---	
						American beech	---	---	
						Sugar maple	---	---	
						White ash	---	---	
						American sycamore	---	---	
HaD2 Homewood (south aspect)	5R	Moderate	Moderate	Moderate	Moderate	Northern red oak	84	66	Black oak, yellow-poplar, red pine, white ash, eastern white pine.
						White oak	---	---	
						Slippery elm	---	---	
						American beech	---	---	
						Sugar maple	---	---	
						White ash	---	---	
						American sycamore	---	---	
JtA Jimtown	5A	Slight	Slight	Slight	Moderate	Northern red oak	85	67	Eastern white pine, yellow-poplar, black cherry, white ash, red pine, white oak, northern red oak, black locust, American sycamore, eastern cottonwood.
						Yellow-poplar	---	---	
						Sugar maple	---	---	
						White ash	---	---	
						White oak	---	---	
						Black cherry	---	---	

See footnote at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Volume*	
KeB, KeC2 Keene	4A	Slight	Slight	Slight	Severe	Northern red oak	80	62	Eastern white pine, yellow-poplar, black walnut, white ash, red pine, white oak, northern red oak.
						White oak	75	57	
						Yellow-poplar	95	98	
						White ash	---	---	
						Black walnut	---	---	
						Black cherry	---	---	
						Sugar maple	---	---	
Km Killbuck	5W	Slight	Moderate	Moderate	Severe	Pin oak	86	68	Red maple, silver maple, green ash, American sycamore, eastern cottonwood, pin oak, swamp white oak, sweetgum, baldcypress.
						Green ash	---	---	
						Black cherry	---	---	
						Eastern cottonwood	---	---	
						Red maple	---	---	
						Swamp white oak	---	---	
LaC Lakin	3S	Slight	Moderate	Slight	Slight	Northern red oak	60	43	Eastern white pine, Japanese larch.
						Chestnut oak	60	43	
						Black oak	60	43	
LcD:									
Lakin	3S	Slight	Moderate	Slight	Slight	Northern red oak	60	43	Eastern white pine, Japanese larch.
						Chestnut oak	60	43	
						Black oak	60	43	
Alford	5R	Slight	Slight	Slight	Moderate	White oak	90	72	Eastern white pine, red pine, black walnut, yellow-poplar, white ash, black locust.
						Yellow-poplar	98	104	
						Sweetgum	76	70	
Lk Lindside	5A	Slight	Slight	Slight	Severe	Northern red oak	86	68	Eastern white pine, yellow-poplar, Norway spruce, Japanese larch, black walnut, black oak, northern red oak, white ash, white oak.
						Yellow-poplar	95	98	
						Black walnut	---	---	
						White ash	85	88	
						White oak	85	67	
						Red maple	---	---	
Lm Lobdell	5A	Slight	Slight	Slight	Severe	Northern red oak	87	69	Eastern white pine, white oak, yellow-poplar, white ash, red pine, northern red oak.
						Yellow-poplar	96	100	
						Sugar maple	---	---	
						White ash	---	---	
						White oak	---	---	
						Black cherry	---	---	

See footnote at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Volume*	
Lo Lorain	5W	Slight	Severe	Severe	Severe	Pin oak	88	70	Silver maple, red maple, sweetgum, green ash, American sycamore, eastern cottonwood.
						Swamp white oak	---	---	
						Green ash	---	---	
						Black cherry	---	---	
						Eastern cottonwood	---	---	
						Red maple	---	---	
LpC2 Lowell	4C	Slight	Slight	Slight	Severe	Northern red oak	70	52	Eastern white pine, yellow-poplar.
						Yellow-poplar	---	---	
LpD2 Lowell (north aspect)	4C	Moderate	Slight	Slight	Severe	Northern red oak	70	52	Eastern white pine, black walnut.
						Black walnut	---	---	
LpD2 Lowell (south aspect)	3C	Moderate	Moderate	Slight	Severe	Northern red oak	60	43	Eastern white pine.
LrE2:									
Lowell (north aspect)	5R	Moderate	Slight	Slight	Severe	Black oak	88	70	White ash, eastern white pine, white oak, northern red oak, yellow-poplar.
						White ash	75	73	
						Hickory	---	---	
						Black locust	77	---	
						Sugar maple	---	---	
						Northern red oak	---	---	
Gilpin (north aspect)	4R	Severe	Slight	Slight	Moderate	Northern red oak	80	62	Japanese larch, eastern white pine, black cherry, yellow-poplar.
						Yellow-poplar	95	98	
LrE2:									
Lowell (south aspect)	5R	Moderate	Slight	Slight	Severe	Black oak	88	70	White ash, eastern white pine, white oak, northern red oak, yellow-poplar.
						White ash	75	73	
						Hickory	---	---	
						Black locust	77	---	
						Sugar maple	---	---	
						Northern red oak	---	---	
Gilpin (south aspect)	4R	Severe	Moderate	Slight	Moderate	Northern red oak	70	52	Japanese larch, eastern white pine, black cherry, yellow-poplar.
						Yellow-poplar	90	90	

See footnote at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Volume*	
LrF: Lowell (north aspect)	5R	Severe	Slight	Slight	Severe	Black oak	88	70	White ash, eastern white pine, white oak, northern red oak, yellow-poplar.
						White ash	75	73	
						Hickory	---	---	
						Black locust	77	---	
						Sugar maple	---	---	
						Northern red oak	---	---	
Gilpin (north aspect)	4R	Severe	Slight	Slight	Moderate	Northern red oak	80	62	Japanese larch, eastern white pine, black cherry, yellow-poplar.
						Yellow-poplar	95	98	
LrF: Lowell (south aspect)	5R	Severe	Slight	Slight	Severe	Black oak	88	70	White ash, eastern white pine, white oak, northern red oak, yellow-poplar.
						White ash	75	73	
						Hickory	---	---	
						Black locust	77	---	
						Sugar maple	---	---	
						Northern red oak	---	---	
Gilpin (south aspect)	4R	Severe	Moderate	Slight	Moderate	Northern red oak	70	52	Japanese larch, eastern white pine, black cherry, yellow-poplar.
						Yellow-poplar	90	90	
Lu Luray	5W	Slight	Severe	Severe	Severe	Pin oak	86	68	Red maple, silver maple, green ash, American sycamore, eastern cottonwood, pin oak, swamp white oak, sweetgum, baldcypress.
						Swamp white oak	---	---	
						Green ash	---	---	
						Red maple	---	---	
						Eastern cottonwood	---	---	
						Black cherry	---	---	
MaB, MbC2 Markland	4C	Slight	Severe	Severe	Moderate	White oak	75	57	Eastern white pine, red pine, yellow-poplar, white ash.
						Northern red oak	78	60	
McD2: Markland	4R	Moderate	Severe	Severe	Moderate	White oak	75	57	Eastern white pine, red pine, yellow-poplar, white ash.
						Northern red oak	78	60	

See footnote at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Volume*	
McD2:									
Glenford	5R	Moderate	Slight	Slight	Severe	Northern red oak	86	68	Eastern white pine, red pine, yellow-poplar, green ash, white ash, white oak, northern red oak, black cherry, black locust.
						Yellow-poplar	96	100	
						White oak	---	---	
						White ash	---	---	
						Black cherry	---	---	
						Sugar maple	---	---	
MdA McGary	4W	Slight	Severe	Severe	Moderate	White oak	70	52	Eastern white pine, baldcypress, white ash, red maple, yellow-poplar, American sycamore, eastern cottonwood, green ash.
						Pin oak	85	67	
						Yellow-poplar	85	81	
						Sweetgum	80	79	
Me Melvin	4W	Slight	Severe	Severe	Severe	Pin oak	99	81	Pin oak, American sycamore, sweetgum, loblolly pine, eastern cottonwood.
						Eastern cottonwood	95	116	
						Sweetgum	92	112	
						Green ash	---	---	
						Hackberry	---	---	
						Hickory	---	---	
						Red maple	---	---	
						American elm	---	---	
MkD Mertz	4F	Slight	Moderate	Slight	Severe	Northern red oak	80	62	Yellow-poplar, eastern white pine, Japanese larch, Norway spruce.
						Yellow-poplar	90	90	
MrB, MrD, MrF Morristown	---	---	---	---	---	---	---	---	Eastern white pine, black locust, red pine, American sycamore, eastern cottonwood, white ash, black ash.

See footnote at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Volume*	
MsB, MsC, MsD, MsE: Morristown	---	---	---	---	---	---	---	---	Eastern white pine, black locust, yellow-poplar, American sycamore, eastern cottonwood, white ash, black ash.
Ne: Newark	5W	Slight	Slight	Moderate	Severe	Pin oak Eastern cottonwood Green ash	96 89 ---	78 100 ---	Eastern cottonwood, sweetgum, American sycamore.
No: Nolin	5A	Slight	Slight	Slight	Severe	Northern red oak Yellow-poplar Eastern cottonwood Black walnut American sycamore River birch	90 107 --- --- --- ---	72 119 --- --- --- ---	Yellow-poplar, eastern white pine, eastern cottonwood, white ash, sweetgum, black walnut.
OmB, OmC: Omulga	4D	Slight	Slight	Moderate	Severe	Northern red oak White oak Black walnut Black cherry Sugar maple White ash Yellow-poplar	80 --- --- --- --- --- ---	62 --- --- --- --- --- ---	Eastern white pine, black walnut, yellow-poplar, white ash, red pine, white oak, northern red oak, green ash, black cherry, black locust, American, sycamore, eastern cottonwood.
RaB: Rawson	4A	Slight	Slight	Slight	Moderate	White oak Northern red oak Yellow-poplar Black cherry Sugar maple White ash	75 80 --- --- --- ---	57 62 --- --- --- ---	Eastern white pine, yellow-poplar, black cherry, white ash, red pine, white oak, northern red oak, green ash, black locust, American sycamore, eastern cottonwood.

See footnote at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Volume*	
RfC Rigley	4A	Slight	Slight	Slight	Moderate	White oak	75	57	White oak, northern red oak, yellow-poplar, eastern white pine.
						Black oak	78	60	
						Northern red oak	---	---	
						Yellow-poplar	94	97	
						American beech	---	---	
						Hickory	---	---	
RgD Rigley (north aspect)	4R	Moderate	Slight	Slight	Moderate	White oak	75	57	White oak, northern red oak, yellow-poplar, eastern white pine.
						Black oak	78	60	
						Northern red oak	---	---	
						Yellow-poplar	94	97	
						American beech	---	---	
						Hickory	---	---	
RgD Rigley (south aspect)	3R	Moderate	Moderate	Slight	Moderate	White oak	65	48	Eastern white pine, white oak.
						Black oak	---	---	
						Hickory	---	---	
						Scarlet oak	---	---	
						American beech	---	---	
						Shortleaf pine	---	---	
RhE:									
Rigley (north aspect)	4R	Moderate	Slight	Slight	Moderate	White oak	75	57	White oak, northern red oak, yellow-poplar, eastern white pine.
						Black oak	78	60	
						Northern red oak	---	---	
						Yellow-poplar	94	97	
						American beech	---	---	
						Hickory	---	---	
Coshocton (north aspect)	4R	Moderate	Slight	Slight	Severe	Northern red oak	80	62	Eastern white pine, yellow-poplar, northern red oak, white oak, red pine, white ash.
						White oak	75	57	
						Yellow-poplar	90	90	
						White ash	---	---	
						Sugar maple	---	---	
						Black cherry	---	---	
RhE:									
Rigley (south aspect)	3R	Moderate	Moderate	Slight	Moderate	White oak	65	48	Eastern white pine, white oak.
						Black oak	---	---	
						Hickory	---	---	
						Scarlet oak	---	---	
						American beech	---	---	
Coshocton (south aspect)	3R	Moderate	Moderate	Slight	Severe	White oak	65	48	Eastern white pine, yellow-poplar, northern red oak, white oak, white ash, red pine.
						Northern red oak	---	---	
						Yellow-poplar	---	---	
						White ash	---	---	
						Sugar maple	---	---	
						Black cherry	---	---	
RoF Rodman	4R	Severe	Severe	Slight	Slight	Northern red oak	70	52	Eastern white pine, red pine, jack pine.
						White oak	70	52	
						Red pine	75	142	
						Eastern white pine	85	196	

See footnote at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Volume*	
Se Sebring	5W	Slight	Severe	Severe	Severe	Pin oak	90	72	Red maple, green ash, pin oak, swamp white oak, American sycamore, eastern cottonwood, sweetgum, eastern white pine, silver maple.
						Swamp white oak	---	---	
						Red maple	---	---	
						Green ash	---	---	
						Black cherry	---	---	
						Eastern cottonwood	---	---	
St Stonelick	4A	Slight	Slight	Slight	Moderate	Northern red oak	80	62	Eastern white pine, black walnut, yellow-poplar, white ash, red pine, white oak.
						Yellow-poplar	95	98	
						White oak	---	---	
						Black walnut	---	---	
						Black cherry	---	---	
						Sugar maple	---	---	
						White ash	---	---	
Ta, Tf Tioga	4A	Slight	Slight	Slight	Moderate	Northern red oak	75	57	Eastern white pine, yellow-poplar, Norway spruce, black walnut, European larch.
						Yellow-poplar	85	81	
						Sugar maple	67	41	
WaB, WaC Watertown	4A	Slight	Slight	Slight	Moderate	Black oak	80	62	Yellow-poplar, black walnut, white ash, black oak, northern red oak, red pine.
						Yellow-poplar	90	90	
						Northern red oak	---	---	
						Red maple	---	---	
						Bur oak	---	---	
						Quaking aspen	---	---	
						Green ash	---	---	
						Slippery elm	---	---	
WhB, WhC2 Wellston	4A	Slight	Slight	Slight	Severe	Northern red oak	81	63	Eastern white pine, black walnut, yellow-poplar, white ash, white oak, northern red oak, red pine, green ash.
						Yellow-poplar	90	90	
						White oak	---	---	
						Black walnut	---	---	
						Black cherry	---	---	
						Sugar maple	---	---	
						White ash	---	---	
WmB, WmC2 Westgate	4A	Slight	Slight	Slight	Severe	Northern red oak	68	50	Eastern white pine, red pine, yellow-poplar, black walnut, white oak, northern red oak, white ash.
						Yellow-poplar	91	92	
						White ash	---	---	

See footnote at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Volume*	
WtC2------------ Westmoreland	4A	Slight	Slight	Slight	Severe	Northern red oak----	75	57	Eastern white pine, yellow-poplar, Virginia pine.
						Yellow-poplar-------	85	81	
						Eastern white pine--	70	151	
WtD2------------ Westmoreland (north aspect)	4R	Moderate	Slight	Slight	Severe	Northern red oak----	81	63	Black walnut, yellow-poplar, eastern white pine.
						Yellow-poplar-------	90	90	
						Eastern white pine--	75	166	
WtD2------------ Westmoreland (south aspect)	4R	Moderate	Slight	Slight	Severe	Northern red oak----	70	52	Eastern white pine, European larch.
						Yellow-poplar-------	80	71	
						Eastern white pine--	65	136	
WtE------------- Westmoreland (north aspect)	4R	Moderate	Slight	Slight	Severe	Northern red oak----	81	65	Black walnut, yellow-poplar, eastern white pine.
						Yellow-poplar-------	90	90	
						Eastern white pine--	75	166	
WtE------------- Westmoreland (south aspect)	4R	Moderate	Slight	Slight	Severe	Northern red oak----	70	52	Eastern white pine, European larch.
						Yellow-poplar-------	80	71	
						Eastern white pine--	65	136	
WuC2:									
Westmoreland---	4A	Slight	Slight	Slight	Severe	Northern red oak----	75	57	Eastern white pine, yellow-poplar.
						Yellow-poplar-------	85	81	
						Eastern white pine--	70	157	
Guernsey-------	4A	Slight	Slight	Slight	Severe	Northern red oak----	78	60	Eastern white pine, yellow-poplar, green ash, white ash, red pine, white oak, northern red oak.
						Yellow-poplar-------	95	98	
						Sugar maple---------	---	---	
						White ash-----------	---	---	
						White oak-----------	---	---	
						Black cherry--------	---	---	
WuD2:									
Westmoreland (north aspect)	4R	Moderate	Slight	Slight	Severe	Northern red oak----	81	63	Black walnut, yellow-poplar, eastern white pine.
						Yellow-poplar-------	90	90	
						Eastern white pine--	75	166	
Guernsey (north aspect)-------	4R	Moderate	Slight	Slight	Severe	Northern red oak----	78	60	Eastern white pine, yellow-poplar, green ash, white ash, red pine, white oak, northern red oak.
						Yellow-poplar-------	95	98	
						Sugar maple---------	---	---	
						White ash-----------	---	---	
						White oak-----------	---	---	
						Black cherry--------	---	---	
WuD2:									
Westmoreland (south aspect)	4R	Moderate	Slight	Slight	Severe	Northern red oak----	70	52	Eastern white pine, European larch.
						Yellow-poplar-------	80	71	
						Eastern white pine--	65	136	

See footnote at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Volume*	
WuD2:									
Guernsey (south aspect)	4R	Moderate	Moderate	Slight	Severe	Northern red oak	70	52	White oak, yellow-poplar, white ash, northern red oak, eastern white pine, red pine.
						White oak	65	48	
						Black cherry	---	---	
						Sugar maple	---	---	
						White ash	---	---	
						Yellow-poplar	---	---	
WuE2:									
Westmoreland (north aspect)	4R	Moderate	Slight	Slight	Severe	Northern red oak	81	63	Black walnut, yellow-poplar, eastern white pine.
						Yellow-poplar	90	90	
						Eastern white pine	75	166	
Guernsey (north aspect)	4R	Moderate	Slight	Slight	Severe	Northern red oak	78	60	Eastern white pine, yellow-poplar, green ash, white ash, red pine, white oak, northern red oak.
						Yellow-poplar	95	98	
						Sugar maple	---	---	
						White ash	---	---	
						White oak	---	---	
						Black cherry	---	---	
WuE2:									
Westmoreland (south aspect)	4R	Moderate	Slight	Slight	Severe	Northern red oak	70	52	Eastern white pine, European larch.
						Yellow-poplar	80	71	
						Eastern white pine	65	136	
Guernsey (south aspect)	4R	Moderate	Moderate	Slight	Severe	Northern red oak	70	52	White oak, yellow-poplar, white ash, northern red oak, eastern white pine, red pine.
						White oak	65	48	
						Black cherry	---	---	
						Sugar maple	---	---	
						White ash	---	---	
						Yellow-poplar	---	---	
ZnB, ZnC2 Zanesville	4A	Slight	Slight	Slight	Moderate	Northern red oak	68	50	Eastern white pine.

* Volume is the yield in cubic feet per acre per year calculated at the age of culmination of mean annual increment for fully stocked natural stands.

TABLE 9.--WOODLAND HARVESTING AND REGENERATION ACTIVITIES

(Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Haul roads	Log landings	Skid trails and logging areas	Site preparation and planting
AaB Aaron	Severe: low strength.	Severe: low strength.	Slight	Slight.
AaC2 Aaron	Severe: low strength, slippage.	Severe: slippage, low strength.	Slight	Slight.
AaD2 Aaron	Severe: low strength, slippage.	Severe: slope, slippage, low strength.	Moderate: slope.	Moderate: slope.
AcB:				
Aaron	Severe: low strength, slippage.	Severe: low strength.	Slight	Slight.
Upshur	Severe: low strength.	Severe: slippage.	Slight	Slight.
AfB, AfC2 Alford	Severe: low strength.	Severe: low strength.	Slight	Slight.
BeB Berks	Slight	Moderate: slope.	Slight	Slight.
BeD2, BeE Berks	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.
BkF:				
Berks	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Westmoreland	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
BoB Bethesda	Slight	Slight	Slight	Slight.
BoD Bethesda	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.
BpF Bethesda	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
BsC2 Brookside	Severe: low strength.	Severe: low strength.	Slight	Moderate: slope, too clayey.
BsE Brookside	Severe: low strength.	Severe: slope, low strength.	Moderate: slope.	Moderate: slope, too clayey.
Cb Chagrin	Slight	Slight	Slight	Slight.
CcA, CcB Chavies	Slight	Slight	Slight	Slight.

TABLE 9.--WOODLAND HARVESTING AND REGENERATION ACTIVITIES--Continued

Soil name and map symbol	Haul roads	Log landings	Skid trails and logging areas	Site preparation and planting
CeA, CeB, ChA, ChB Chili	Slight	Slight	Slight	Slight.
ChC Chili	Slight	Moderate: slope.	Slight	Slight.
CkA Cidermill	Slight	Slight	Slight	Slight.
CnB, CnC2 Cincinnati	Severe: low strength.	Severe: low strength.	Slight	Slight.
CpC2 Clarksburg	Severe: low strength.	Severe: low strength.	Slight	Slight.
CrC: Claysville	Severe: slippage.	Severe: slope, low strength.	Severe: slippage.	Slight.
Guernsey	Severe: slippage.	Severe: slippage.	Slight	Slight.
CsC2 Coshocton	Severe: low strength.	Severe: slope.	Slight	Slight.
CsD Coshocton	Severe: low strength.	Severe: slope.	Moderate: slope.	Moderate: slope.
CtE: Coshocton	Severe: low strength.	Severe: slope.	Moderate: slope.	Moderate: slope.
Westmoreland	Moderate: low strength, slope.	Severe: slope.	Moderate: slope.	Moderate: slope.
FaB Fairpoint	Slight	Moderate: slope.	Slight	Slight.
FaD Fairpoint	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.
FaE Fairpoint	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.
FbF Fairpoint	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
FcA, FcB Fitchville	Severe: low strength, wetness.	Severe: low strength, wetness.	Severe: wetness.	Severe: wetness.
FkB: Frankstown Variant	Moderate: depth to rock.	Moderate: depth to rock.	Slight	Slight.
Mertz	Slight	Slight	Slight	Slight.
GdB Gilpin	Slight	Slight	Slight	Slight.

TABLE 9.--WOODLAND HARVESTING AND REGENERATION ACTIVITIES--Continued

Soil name and map symbol	Haul roads	Log landings	Skid trails and logging areas	Site preparation and planting
GdC2 Gilpin	Slight	Moderate: slope.	Slight	Slight.
GeD2:				
Gilpin	Moderate: depth to rock, slope.	Severe: slope.	Moderate: slope.	Moderate: slope.
Upshur	Severe: slippage.	Severe: slope.	Moderate: slope.	Moderate: slope.
GeE2:				
Gilpin	Moderate: slope, depth to rock.	Severe: slope.	Moderate: slope.	Moderate: slope.
Upshur	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.
GfA, GfB, GfC2 Glenford	Severe: low strength.	Severe: low strength.	Slight	Slight.
GtC2:				
Guernsey	Severe: slippage.	Severe: slippage.	Slight	Slight.
Upshur	Severe: slippage.	Severe: slippage.	Moderate: slope.	Moderate: slope.
GtD2:				
Guernsey	Severe: slippage.	Severe: slippage, slope.	Moderate: slope.	Moderate: slope.
Upshur	Severe: slippage.	Severe: slippage, slope.	Moderate: slope.	Moderate: slope.
HaC2 Homewood	Moderate: low strength.	Moderate: slope.	Slight	Slight.
HaD2 Homewood	Moderate: slope, low strength.	Severe: low strength, slope.	Moderate: slope.	Moderate: slope.
JtA Jimtown	Moderate: wetness.	Moderate: wetness.	Slight	Slight.
KeB, KeC2 Keene	Severe: low strength.	Severe: slope.	Slight	Slight.
Km Killbuck	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
LaC Lakin	Slight	Moderate: slope.	Slight	Slight.
LcD:				
Lakin	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.

TABLE 9.--WOODLAND HARVESTING AND REGENERATION ACTIVITIES--Continued

Soil name and map symbol	Haul roads	Log landings	Skid trails and logging areas	Site preparation and planting
LcD:				
Alford	Severe: low strength, slope.	Severe: slope, low strength.	Moderate: slope.	Moderate: slope.
Lk Lindside	Severe: flooding.	Severe: flooding.	Slight	Slight.
Lm Lobdell	Moderate: low strength.	Moderate: low strength.	Slight	Slight.
Lo Lorain	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
LpC2 Lowell	Severe: low strength.	Moderate: slope.	Slight	Slight.
LpD2 Lowell	Severe: slippage, low strength.	Severe: low strength, slope.	Moderate: slope.	Moderate: slope.
LrE2:				
Lowell	Severe: low strength.	Severe: low strength, slope.	Moderate: slope.	Moderate: slope.
Gilpin	Moderate: slope, depth to rock.	Severe: low strength, slope.	Moderate: slope.	Moderate: slope.
LrF:				
Lowell	Severe: low strength, slope, slippage.	Severe: low strength, slope.	Severe: slope.	Severe: slope.
Gilpin	Severe: slope.	Severe: low strength, slope.	Severe: slope.	Severe: slope.
Lu Luray	Severe: wetness.	Severe: low strength.	Severe: wetness.	Severe: wetness.
MaB, MbC2 Markland	Severe: low strength.	Severe: low strength.	Slight	Slight.
McD2:				
Markland	Severe: low strength.	Severe: low strength, slope.	Moderate: slope.	Moderate: slope.
Glenford	Moderate: slope.	Severe: low strength, slope.	Moderate: slope.	Moderate: slope.
MdA McGary	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness.	Severe: wetness.
Me Melvin	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.

TABLE 9.--WOODLAND HARVESTING AND REGENERATION ACTIVITIES--Continued

Soil name and map symbol	Haul roads	Log landings	Skid trails and logging areas	Site preparation and planting
MkD Mertz	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.
MrB Morristown	Slight	Slight	Slight	Slight.
MrD Morristown	Severe: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.
MrF Morristown	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
MsB, MsC Morristown	Slight	Slight	Slight	Slight.
MsD Morristown	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.
MsE Morristown	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Ne Newark	Severe: flooding.	Severe: flooding.	Moderate: flooding.	Moderate: flooding.
No Nolin	Severe: flooding.	Severe: flooding.	Moderate: flooding.	Moderate: flooding.
OmB, OmC Omulga	Severe: low strength.	Severe: low strength.	Slight	Slight.
RaB Rawson	Slight	Slight	Slight	Slight.
RfC Rigley	Slight	Moderate: slope.	Slight	Slight.
RgD Rigley	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.
RhE:				
Rigley	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.
Coshocton	Severe: low strength.	Severe: slope.	Moderate: slope.	Moderate: slope.
RoF Rodman	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Se Sebring	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
St Stonelick	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.
Ta Tioga	Slight	Slight	Slight	Slight.
Tf Tioga	Moderate: flooding.	Moderate: flooding.	Moderate: flooding.	Moderate: flooding.
WaB Watertown	Slight	Slight	Slight	Slight.

TABLE 9.--WOODLAND HARVESTING AND REGENERATION ACTIVITIES--Continued

Soil name and map symbol	Haul roads	Log landings	Skid trails and logging areas	Site preparation and planting
WaC Watertown	Slight	Moderate: slope.	Slight	Slight.
WhB Wellston	Moderate: low strength.	Moderate: low strength.	Slight	Slight.
WhC2 Wellston	Moderate: low strength.	Moderate: low strength, slope.	Slight	Slight.
WmB, WmC2 Westgate	Severe: low strength.	Severe: low strength.	Slight	Slight.
WtC2 Westmoreland	Moderate: low strength.	Moderate: slope.	Slight	Slight.
WtD2, WtE Westmoreland	Moderate: low strength, slope.	Severe: slope.	Moderate: slope.	Moderate: slope.
WuC2:				
Westmoreland	Moderate: low strength.	Moderate: slope.	Slight	Slight.
Guernsey	Severe: low strength.	Severe: slippage.	Slight	Slight.
WuD2:				
Westmoreland	Moderate: low strength, slope.	Severe: slope.	Moderate: slope.	Moderate: slope.
Guernsey	Severe: slippage.	Severe: slope, slippage.	Moderate: slope.	Moderate: slope.
WuE2:				
Westmoreland	Moderate: slope.	Severe: low strength, slope.	Moderate: slope.	Moderate: slope.
Guernsey	Severe: slippage.	Severe: slope, slippage.	Moderate: slope.	Moderate: slope.
ZnB, ZnC2 Zanesville	Severe: low strength.	Severe: low strength.	Slight	Slight.

TABLE 10.--CHRISTMAS TREE SUITABILITY RATINGS*

Soil name and map symbol	White pine	Scotch pine	Austrian pine	White spruce	Norway spruce	Blue spruce	Douglas-fir	Fraser fir	Balsam fir
AaB, AaC2, AaD2------ Aaron	S-7	S-7	S-7	S-7	S-7	L-7	L-3	L-3	L-3
AcB------------------ Aaron-Upshur	S-7	S-7	S-7	S-7	S-7	L-7	L-3	L-3	L-3
AfB, AfC2------------ Alford	S	S	S	S	S	S	S	S	S
BeB, BeD2, BeE------- Berks	S-5	S-5	S-5	L-2	L-2	L-2	L-2	L-2	L-2
BkF------------------ Berks-Westmoreland	S-5	S-5	S-5	L-2	L-2	L-2	L-2	L-2	L-2
BoB, BoD, BpF-------- Bethesda	L-5	L-5	L-5	N-5	N-5	N-5	N-5	N-5	N-5
BsC2, BsE------------ Brookside	S-7	S-7	S-7	S-7	S-7	L-1,7	L-3	L-3	S-1,7
Cb------------------- Chagrin	S	S	S	S-1	S-1	S-1	S-1	S-1	S-1
CcA, CcB------------- Chavies	S	S	S	S	S	S	S	S	S
CeA, CeB------------- Chili	S-5	S-5	S-5	S-5	S-5	S-5	S-5	S-5	S-5
ChA, ChB, ChC-------- Chili	S-5	S-5	S-5	S-5	S-5	S-5	S-5	S-5	S-5
CkA------------------ Cidermill	S	S	S	S	S	S	S	S	S
CnB, CnC2------------ Cincinnati	S-4	S-4	S-4	S-4	S-4	S-4	S-4	S-4	S-4
CpC2----------------- Clarksburg	S	S	S	S-1	S-1	L-1	L-3	L-3	S-1
CrC------------------ Claysville-Guernsey	L-3	L-3	L-3	L-3	L-3	L-3	L-1,3	L-1,3	L-1,3
CsC2, CsD------------ Coshocton	S	S	S	S-1	S-1	L-1	L-3	L-3	S-1
CtE------------------ Coshocton- Westmoreland	S	S	S	S	S	L	L-3	L-3	S
Ds------------------- Dumps and Pits	NR	NR	NR	NR	NR	NR	NR	NR	NR
FaB, FaD, FaE, FbF--- Fairpoint	L-2	L-2	L-2	N-2	N-2	N-2	N-2	N-2	N-2
FcA, FcB------------- Fitchville	L-3	L-3	L-3	L-3	L-3	L-3	N-3	N-3	N-3

* See ratings guide at end of table.

TABLE 10.--CHRISTMAS TREE SUITABILITY RATINGS*--Continued

Soil name and map symbol	White pine	Scotch pine	Austrian pine	White spruce	Norway spruce	Blue spruce	Douglas-fir	Fraser fir	Balsam fir
FkB Frankstown Variant-Mertz	S	S	S	L-2	L-2	L-2	L-2	L-2	L-2
GdB, GdC2 Gilpin	S	S	S	L-2	L-2	L-2	L-2	L-2	L-2
GeD2, GeE2 Gilpin-Upshur	S-7	S-7	S-7	L-7	L-7	L-7	L-7	L-7	L-7
GfA, GfB, GfC2 Glenford	S	S	S	S	S	L-3	L-3	L-3	S
GtC2, GtD2 Guernsey-Upshur	S-6,7	S-6,7	S-6,7	S-6,7	S-6,7	L-6,7	L	L	L-6,7
HaC2, HaD2 Homewood	S	S	S	S	S	L-3	L-3	L-3	S
JtA Jimtown	L-3	L-3	L-3	L-3	L-3	L-3	L-3	L-3	L-3
KeB, KeC2 Keene	S-4	S-4	S-4	S-4	S-4	L-3	L-3	L-3	S-4
Km Killbuck	L-3	L-3	L-3	L-3	L-3	L-3	L-1,3	L-1,3	L-1,3
LaC Lakin	L-2	L-2	L-2	L-2	L-2	L-2	L-2	L-2	L-2
LcD Lakin-Alford	S	S	S	L-5	L-5	L-5	L-5	L-5	L-5
Lk Lindside	S	S	S	S	S	L-3	L-3	L-3	S
Lm Lobdell	S	S	S	S	S	L-3	L-3	L-3	S
Lo Lorain	L-3	L-3	L-3	L-3	L-3	L-3	N	N	L-1,3
LpC2, LpD2 Lowell	S-7	S-7	S-7	S-7	S-7	S-7	S-7	S-7	S-7
LrE2, LrF Lowell-Gilpin	S-5,7	S-5,7	S-5,7	S-5,7	S-5,7	S-5,7	S-5,7	S-5,7	S-5,7
Lu Luray	L-3	L-3	L-3	L-3	L-3	L-3	L-1,3	L-1,3	L-1,3
MaB, MbC2 Markland	S-7	S-7	S-7	S-1,7	S-1,7	S-1,3,7	L-3	L-3	S-1,7
McD2 Markland-Glenford	S-7	S-7	S-7	S-7	S-7	L-3,7	L-3,7	L-3,7	S-7
MdA McGary	L-3	L-3	L-3	L-3	L-3	L-3	N-3	N-3	L-1,3
Me Melvin	L-3	L-3	L-3	L-3	L-3	L-3	N-3	N-3	L-1,3

* See ratings guide at end of table.

TABLE 10.--CHRISTMAS TREE SUITABILITY RATINGS*--Continued

Soil name and map symbol	White pine	Scotch pine	Austrian pine	White spruce	Norway spruce	Blue spruce	Douglas-fir	Fraser fir	Balsam fir
MkD------------------- Mertz	S-5	S-5	S-5	L-2	L-2	L-2	L-2	L-2	L-2
MrB, MrD, MrF, MsB, MsC, MsD, MsE------- Morristown	L-2	L-2	L-2	N-2	N-2	N-2	N-2	N-2	N-2
Ne-------------------- Newark	L-3	L-3	L-3	L-3	L-3	L-3	N-3	N-3	L-1,3
No-------------------- Nolin	S	S	S	S-1	S-1	S-1	S-1	S-1	S-1
OmB, OmC------------- Omulga	S-4	S-4	S-4	S-1,4	S-1,4	L-1,4	L-3,4	L-3,4	S-1,4
RaB------------------- Rawson	S-4	S-4	S-4	S-1,4	S-1,4	L-1,3,5	L-3,4	L-3,4	S-1,4
RfC, RgD------------- Rigley	S-5	S-5	S-5	L-5	L-5	L-5	L-5	L-5	L-5
RhE------------------- Rigley-Coshocton	S-6	S-6	S-6	L-6	L-6	L-6	N-3	N-3	L-6
RoF------------------- Rodman	L-2	L-2	L-2	N-2	N-2	N-2	N-2	N-2	N-2
Se-------------------- Sebring	L-3	L-3	L-3	L-3	L-3	L-3	N-3	N-3	L-3
St-------------------- Stonelick	S-5	S-5	S-5	S-1,5	S-1,5	S-1,5	S-1,5	S-1,5	S-1,5
Ta, Tf--------------- Tioga	S	S	S	S-1	S-1	S-1	S-1	S-1	S-1
Ud, Ug, Uh, Uk------- Udorthents	L-5	L-5	L-5	N-2	N-2	N-2	N-2	N-2	N-2
UsB------------------- Urban land-Glenford	NR	NR	NR	NR	NR	NR	NR	NR	NR
UtA------------------- Urban land-Nolin	NR	NR	NR	NR	NR	NR	NR	NR	NR
UvB------------------- Urban land-Watertown	NR	NR	NR	NR	NR	NR	NR	NR	NR
UwC------------------- Urban land-Wellston	NR	NR	NR	NR	NR	NR	NR	NR	NR
WaB, WaC------------- Watertown	S-5	S-5	S-5	L-2	L-2	L-2	L-2	L-2	L-2
WhB, WhC2------------ Wellston	S	S	S	S	S	S	S	S	S
WmB, WmC2------------ Westgate	S-4	S-4	S-4	S-1,4	S-1,4	L-1,3,4	L-3,4	L-3,4	S-1,4
WtC2, WtD2, WtE------ Westmoreland	S	S	S	S	S	S	S	S	S

* See ratings guide at end of table.

TABLE 10.--CHRISTMAS TREE SUITABILITY RATINGS*--Continued

Soil name and map symbol	White pine	Scotch pine	Austrian pine	White spruce	Norway spruce	Blue spruce	Douglas-fir	Fraser fir	Balsam fir
WuC2, WuD2, WuE2----- Westmoreland-Guernsey	S-6	S-6	S-6	S-6	S-6	S-6	S-6	S-6	S-6
WvD------------------ Westmoreland-Urban land	NR	NR	NR	NR	NR	NR	NR	NR	NR
ZnB, ZnC2------------ Zanesville	S-4	S-4	S-4	S-4	S-4	L-3,4	L-3,4	L-3,4	S-4

RATINGS GUIDE

S = Suitable: Growth and/or foliage quality should be good to excellent with proper management.
L = Limited suitability: The species will probably grow, but there may be reductions in growth and/or foliage quality, even with good management.
N = Not suitable: Survival, growth, and/or foliage quality will probably be so impaired that the species should not be planted.
NR = Not rated for Christmas tree production.

1--Hazard of frost
2--Hazard of drought
3--Seasonal wetness
4--Potential root damage from frost heave
5--Moisture shortages
6--Seep spots
7--Cracking

TABLE 11.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS

(The symbol < means less than; > means more than. Absence of an entry indicates that trees generally do not grow to the given height on that soil)

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
AaB, AaC2, AaD2--- Aaron	---	Washington hawthorn, Amur honeysuckle, Amur privet, American cranberrybush, eastern redcedar, arrowwood.	Green ash, Osage-orange, Austrian pine.	Eastern white pine, pin oak.	---
AcB:					
Aaron------------	---	Washington hawthorn, Amur honeysuckle, Amur privet, American cranberrybush, eastern redcedar, arrowwood.	Green ash, Osage-orange, Austrian pine.	Eastern white pine, pin oak.	---
Upshur-----------	---	American cranberrybush, Amur honeysuckle, Amur privet, arrowwood, Washington hawthorn, eastern redcedar.	Hackberry, Osage-orange, Austrian pine.	Pin oak, eastern white pine.	---
AfB, AfC2--------- Alford	---	Amur honeysuckle, American cranberrybush, Amur privet, silky dogwood.	White fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
BeB, BeD2, BeE---- Berks	Siberian peashrub	Amur honeysuckle, lilac, Washington hawthorn, radiant crabapple, eastern redcedar.	Jack pine, Austrian pine, red pine, eastern white pine.	---	---
BkF:					
Berks------------	Siberian peashrub	Amur honeysuckle, lilac, Washington hawthorn, radiant crabapple, eastern redcedar.	Jack pine, Austrian pine, red pine, eastern white pine.	---	---
Westmoreland-----	---	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, blue spruce, northern whitecedar, white fir.	Austrian pine, Norway spruce.	Pin oak, eastern white pine.

TABLE 11.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
BoB, BoD, BpF. Bethesda					
BsC2-------------- Brookside	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce-----	Eastern white pine, pin oak.
BsE. Brookside					
Cb---------------- Chagrin	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce-----	Eastern white pine, pin oak.
CcA, CcB---------- Chavies	---	Amur honeysuckle, Amur privet, American cranberrybush, Washington hawthorn.	Northern whitecedar, Osage-orange, Austrian pine, eastern redcedar.	Red pine, eastern white pine, Norway spruce.	---
CeA, CeB, ChA, ChB, ChC--------- Chili	Siberian peashrub	Lilac, Amur honeysuckle, Washington hawthorn, radiant crabapple, eastern redcedar.	Eastern white pine, jack pine, red pine, Austrian pine.	---	---
CkA--------------- Cidermill	---	Silky dogwood, Amur privet, American cranberrybush, Amur honeysuckle.	Blue spruce, Washington hawthorn, white fir, northern whitecedar.	Norway spruce, Austrian pine.	Pin oak, eastern white pine.
CnB, CnC2--------- Cincinnati	---	Eastern redcedar, Washington hawthorn, Amur privet, Amur honeysuckle, arrowwood, American cranberrybush.	Green ash, Austrian pine, Osage-orange.	Pin oak, eastern white pine.	---
CpC2-------------- Clarksburg	---	American cranberrybush, Amur honeysuckle, Amur privet, arrowwood, Washington hawthorn, eastern redcedar.	Hackberry, Osage-orange, Austrian pine.	Pin oak, eastern white pine.	---

TABLE 11.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
CrC:					
Claysville	---	Amur privet, American cranberrybush, eastern redcedar, arrowwood, Washington hawthorn, Amur honeysuckle.	Osage-orange, Austrian pine, green ash.	Pin oak	---
Guernsey	---	American cranberrybush, Amur honeysuckle, arrowwood, Amur privet, Washington hawthorn, eastern redcedar.	Osage-orange, green ash, Austrian pine.	Eastern white pine, pin oak.	---
CsC2, CsD Coshocton	---	Silky dogwood, Amur honeysuckle, Amur privet, American cranberrybush.	Northern whitecedar, blue spruce, Washington hawthorn, Austrian pine, white fir.	Norway spruce	Pin oak, eastern white pine.
CtE:					
Coshocton	---	Silky dogwood, Amur honeysuckle, Amur privet, American cranberrybush.	Northern whitecedar, blue spruce, Washington hawthorn, Austrian pine, white fir.	Norway spruce	Pin oak, eastern white pine.
Westmoreland	---	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, blue spruce, northern whitecedar, white fir.	Austrian pine, Norway spruce.	Pin oak, eastern white pine.
Ds. Dumps and Pits					
FaB, FaD, FaE, FbF. Fairpoint					
FcA, FcB Fitchville	---	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Northern whitecedar, Austrian pine, white fir, blue spruce, Washington hawthorn.	Norway spruce	Pin oak, eastern white pine.

TABLE 11.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
FkB: Frankstown Variant	Siberian peashrub	Lilac, Amur honeysuckle, Washington hawthorn, radiant crabapple, eastern redcedar.	Eastern white pine, jack pine, red pine, Austrian pine.	---	---
Mertz.					
GdB, GdC2 Gilpin	Siberian peashrub	Amur honeysuckle, lilac, Washington hawthorn, radiant crabapple, eastern redcedar.	Jack pine, Austrian pine, red pine, eastern white pine.	---	---
GeD2, GeE2: Gilpin	Siberian peashrub	Amur honeysuckle, lilac, Washington hawthorn, radiant crabapple, eastern redcedar.	Jack pine, Austrian pine, red pine, eastern white pine.	---	---
Upshur	---	American cranberrybush, Amur honeysuckle, Amur privet, arrowwood, Washington hawthorn, eastern redcedar.	Hackberry, Osage-orange, Austrian pine.	Pin oak, eastern white pine.	---
GfA, GfB, GfC2 Glenford	---	Silky dogwood, Amur honeysuckle, Amur privet, American cranberrybush.	Northern whitecedar, Austrian pine, white fir, blue spruce, Washington hawthorn.	Norway spruce	Eastern white pine, pin oak
GtC2, GtD2: Guernsey	---	American cranberrybush, Amur honeysuckle, arrowwood, Amur privet, Washington hawthorn, eastern redcedar.	Osage-orange, green ash, Austrian pine.	Eastern white pine, pin oak.	---
Upshur	---	American cranberrybush, Amur honeysuckle, Amur privet, arrowwood, Washington hawthorn, eastern redcedar.	Hackberry, Osage-orange, Austrian pine.	Pin oak, eastern white pine.	---

TABLE 11.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
HaC2, HaD2-------- Homewood	---	American cranberrybush, Amur honeysuckle, arrowwood, Amur privet, Washington hawthorn, eastern redcedar.	Osage-orange, green ash, Austrian pine.	Eastern white pine, pin oak.	---
JtA--------------- Jimtown	---	Amur honeysuckle, silky dogwood, American cranberrybush, Amur privet.	Northern whitecedar, blue spruce, Austrian pine, white fir, Washington hawthorn.	Norway spruce-----	Pin oak, eastern white pine.
KeB, KeC2--------- Keene	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	Northern whitecedar, Austrian pine, Washington hawthorn, white fir, blue spruce.	Norway spruce-----	Eastern white pine, pin oak.
Km---------------- Killbuck	---	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, white fir, blue spruce, northern whitecedar, Austrian pine, Norway spruce.	Eastern white pine	Pin oak.
LaC--------------- Lakin	Siberian peashrub	Amur honeysuckle, lilac, Washington hawthorn, radiant crabapple, eastern redcedar.	Jack pine, red pine, Austrian pine.	Eastern white pine	---
LcD:					
Lakin------------	Siberian peashrub	Amur honeysuckle, lilac, Washington hawthorn, radiant crabapple, eastern redcedar.	Jack pine, red pine, Austrian pine.	Eastern white pine	---
Alford-----------	---	Amur honeysuckle, American cranberrybush, Amur privet, silky dogwood.	White fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
Lk---------------- Lindside	---	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, blue spruce, northern whitecedar, white fir, Austrian pine.	Norway spruce-----	Pin oak, eastern white pine.

TABLE 11.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
Lm---------------- Lobdell	---	Silky dogwood, Amur honeysuckle, Amur privet, American cranberrybush.	Northern whitecedar, Austrian pine, white fir, blue spruce, Washington hawthorn.	Norway spruce-----	Pin oak, eastern white pine.
Lo---------------- Lorain	---	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, white fir, blue spruce, northern whitecedar, Austrian pine, Norway spruce.	Eastern white pine	Pin oak.
LpC2, LpD2-------- Lowell	---	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, blue spruce, northern whitecedar, white fir.	Norway spruce-----	Austrian pine, pin oak, eastern white pine.
LrE2, LrF:					
Lowell-----------	---	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, blue spruce, northern whitecedar, white fir.	Norway spruce-----	Austrian pine, pin oak, eastern white pine.
Gilpin-----------	Siberian peashrub	Amur honeysuckle, lilac, Washington hawthorn, radiant crabapple, eastern redcedar.	Jack pine, Austrian pine, red pine, eastern white pine.	---	---
Lu---------------- Luray	---	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, white fir, blue spruce, northern whitecedar, Austrian pine, Norway spruce.	Eastern white pine	Pin oak.
MaB, MbC2--------- Markland	---	Arrowwood, Washington hawthorn, eastern redcedar, Amur honeysuckle, American cranberrybush, Amur privet.	Austrian pine, green ash, Osage-orange.	Eastern white pine, pin oak.	---
McD2:					
Markland---------	---	Arrowwood, Washington hawthorn, eastern redcedar, Amur honeysuckle, American cranberrybush, Amur privet.	Austrian pine, green ash, Osage-orange.	Eastern white pine, pin oak.	---

TABLE 11.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
McD2: Glenford	---	Silky dogwood, Amur honeysuckle, Amur privet, American cranberrybush.	Northern whitecedar, Austrian pine, white fir, blue spruce, Washington hawthorn.	Norway spruce	Eastern white pine, pin oak.
MdA McGary	---	Eastern redcedar, Washington hawthorn, Amur privet, arrowwood, Amur honeysuckle, American cranberrybush.	Austrian pine, green ash, Osage-orange.	Eastern white pine, pin oak.	---
Me. Melvin					
MkD. Mertz					
MrB, MrD, MrF, MsB, MsC, MsD, MsE Morristown	Siberian peashrub	Washington hawthorn, eastern redcedar, jack pine, Russian-olive, Osage-orange.	Honeylocust, northern catalpa.	---	---
Ne Newark	---	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, blue spruce, northern whitecedar, white fir, Austrian pine, Norway spruce.	Eastern white pine	Pin oak.
No Nolin	---	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, blue spruce, northern whitecedar, white fir, Austrian pine.	Norway spruce	Pin oak, eastern white pine.
OmB, OmC Omulga	---	American cranberrybush, Amur honeysuckle, arrowwood, Amur privet, Washington hawthorn, eastern redcedar.	Osage-orange, green ash, Austrian pine.	Eastern white pine, pin oak.	---

TABLE 11.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
RaB: Rawson	---	Silky dogwood, Amur honeysuckle, Amur privet, American cranberrybush.	Northern whitecedar, Austrian pine, white fir, blue spruce, Washington hawthorn.	Norway spruce	Eastern white pine, pin oak.
RfC, RgD: Rigley	---	American cranberrybush, Amur honeysuckle, Amur privet, Washington hawthorn.	Eastern redcedar, Osage-orange, northern whitecedar, Austrian pine.	Red pine, Norway spruce, eastern white pine.	---
RhE:					
Rigley	---	American cranberrybush, Amur honeysuckle, Amur privet, Washington hawthorn.	Eastern redcedar, Osage-orange, northern whitecedar, Austrian pine.	Red pine, Norway spruce, eastern white pine.	---
Coshocton	---	Silky dogwood, Amur honeysuckle, Amur privet, American cranberrybush.	Northern whitecedar, blue spruce, Washington hawthorn, Austrian pine, white fir.	Norway spruce	Pin oak, eastern white pine.
RoF: Rodman	Siberian peashrub	Silky dogwood, gray dogwood, Amur honeysuckle, Washington hawthorn, radiant crabapple, eastern redcedar.	Black locust, jack pine, Virginia pine.	---	---
Se: Sebring	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	Northern whitecedar, Austrian pine, Norway spruce, blue spruce, white fir, Washington hawthorn.	Eastern white pine	Pin oak.
St: Stonelick	---	Siberian peashrub	Green ash, eastern redcedar, Osage-orange, northern whitecedar, nannyberry viburnum, white spruce, Washington hawthorn.	Black willow	---
Ta, Tf: Tioga	---	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, blue spruce, northern whitecedar, white fir, Austrian pine.	Norway spruce	Pin oak, eastern white pine.

TABLE 11.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
Ud, Ug, Uh. Udorthents					
Uk:					
Udorthents.					
Pits.					
UsB:					
Urban land.					
Glenford	---	Silky dogwood, Amur honeysuckle, Amur privet, American cranberrybush.	Northern whitecedar, Austrian pine, white fir, blue spruce, Washington hawthorn.	Norway spruce	Eastern white pine, pin oak.
UtA:					
Urban land.					
Nolin	---	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, blue spruce, northern whitecedar, white fir, Austrian pine.	Norway spruce	Pin oak, eastern white pine.
UvB:					
Urban land.					
Watertown	---	American cranberrybush, Amur privet, Amur honeysuckle, Washington hawthorn.	Northern whitecedar, eastern redcedar, Osage-orange, Austrian pine.	Eastern white pine, Norway spruce, red pine.	---
UwC:					
Urban land.					
Wellston	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	White fir, northern whitecedar, blue spruce, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
WaB, WaC Watertown	---	American cranberrybush, Amur privet, Amur honeysuckle, Washington hawthorn.	Northern whitecedar, eastern redcedar, Osage-orange, Austrian pine.	Eastern white pine, Norway spruce, red pine.	---
WhB, WhC2 Wellston	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	White fir, northern whitecedar, blue spruce, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.

TABLE 11.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
WmB, WmC2--------- Westgate	---	Washington hawthorn, Amur honeysuckle, Amur privet, American cranberrybush, eastern redcedar, arrowwood.	Green ash, Osage-orange, Austrian pine.	Eastern white pine, pin oak.	---
WtC2, WtD2, WtE--- Westmoreland	---	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, blue spruce, northern whitecedar, white fir.	Austrian pine, Norway spruce.	Pin oak, eastern white pine.
WuC2, WuD2, WuE2:					
Westmoreland-----	---	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, blue spruce, northern whitecedar, white fir.	Austrian pine, Norway spruce.	Pin oak, eastern white pine.
Guernsey---------	---	American cranberrybush, Amur honeysuckle, arrowwood, Amur privet, Washington hawthorn, eastern redcedar.	Osage-orange, green ash, Austrian pine.	Eastern white pine, pin oak.	---
WvD:					
Westmoreland-----	---	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, blue spruce, northern whitecedar, white fir.	Austrian pine, Norway spruce.	Pin oak, eastern white pine.
Urban land.					
ZnB, ZnC2--------- Zanesville	---	American cranberrybush, Amur honeysuckle, Amur privet, arrowwood, Washington hawthorn, eastern redcedar.	Hackberry, Osage-orange, Austrian pine.	Pin oak, eastern white pine.	---

TABLE 12.--RECREATIONAL DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
AaB Aaron	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: erodes easily.	Moderate: wetness.
AaC2 Aaron	Moderate: slope, wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: wetness, slope.
AaD2 Aaron	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
AcB:					
Aaron	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: erodes easily.	Moderate: wetness.
Upshur	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Severe: erodes easily.	Slight.
AfB Alford	Slight	Slight	Moderate: slope.	Slight	Slight.
AfC2 Alford	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
BeB Berks	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight	Severe: small stones.
BeD2 Berks	Severe: slope.	Severe: slope.	Severe: small stones, slope.	Moderate: slope.	Severe: slope, small stones.
BeE Berks	Severe: slope.	Severe: slope.	Severe: small stones, slope.	Severe: slope.	Severe: slope, small stones.
BkF:					
Berks	Severe: slope.	Severe: slope.	Severe: small stones, slope.	Severe: slope.	Severe: slope, small stones.
Westmoreland	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
BoB Bethesda	Moderate: slope, small stones, percs slowly.	Moderate: slope, small stones, percs slowly.	Severe: slope, small stones.	Slight	Severe: droughty.
BoD Bethesda	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: droughty, slope.

TABLE 12.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
BpF Bethesda	Severe: slope.	Severe: slope.	Severe: large stones, slope, small stones.	Severe: slope.	Severe: large stones, droughty, slope.
BsC2 Brookside	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
BsE Brookside	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
Cb Chagrin	Severe: flooding.	Slight	Moderate: small stones.	Slight	Slight.
CcA Chavies	Slight	Slight	Moderate: small stones.	Slight	Slight.
CcB Chavies	Slight	Slight	Moderate: slope, small stones.	Slight	Slight.
CeA Chili	Slight	Slight	Moderate: small stones.	Slight	Moderate: droughty.
CeB Chili	Slight	Slight	Moderate: slope, small stones.	Slight	Moderate: droughty.
ChA, ChB Chili	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight	Moderate: small stones, droughty.
ChC Chili	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight	Moderate: small stones, droughty, slope.
CkA Cidermill	Slight	Slight	Slight	Slight	Slight.
CnB Cincinnati	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight	Slight.
CnC2 Cincinnati	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
CpC2 Clarksburg	Moderate: wetness, slope.	Moderate: wetness, slope.	Severe: slope.	Severe: erodes easily.	Moderate: wetness, slope.
CrC: Claysville	Severe: wetness.	Moderate: slope, wetness.	Severe: slope, wetness.	Moderate: wetness.	Moderate: wetness, slope.

TABLE 12.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
CrC:					
Guernsey	Moderate: slope, wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope, wetness.
CsC2 Coshocton	Moderate: slope, wetness.	Moderate: slope, wetness.	Severe: slope.	Severe: erodes easily.	Moderate: wetness, slope.
CsD Coshocton	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
CtE:					
Coshocton	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
Westmoreland	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
Ds. Dumps and Pits					
FaB Fairpoint	Moderate: percs slowly.	Moderate: percs slowly.	Severe: slope.	Slight	Severe: droughty.
FaD Fairpoint	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: droughty, slope.
FaE Fairpoint	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: droughty, slope.
FbF Fairpoint	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope.	Severe: small stones, droughty, slope.
FcA, FcB Fitchville	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
FkB:					
Frankstown Variant	Slight	Slight	Moderate: slope, small stones, thin layer.	Slight	Moderate: large stones, thin layer, area reclaim.
Mertz	Moderate: small stones, percs slowly.	Moderate: small stones, percs slowly.	Severe: small stones.	Slight	Moderate: small stones.
GdB Gilpin	Slight	Slight	Moderate: small stones, slope.	Slight	Moderate: thin layer.

TABLE 12.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
GdC2: Gilpin	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope, thin layer.
GeD2:					
Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Upshur	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
GeE2:					
Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Upshur	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
GfA: Glenford	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: wetness.	Slight.
GfB: Glenford	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Moderate: wetness.	Slight.
GfC2: Glenford	Moderate: slope, wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
GtC2:					
Guernsey	Moderate: slope, wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope, wetness.
Upshur	Moderate: slope, percs slowly.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
GtD2:					
Guernsey	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
Upshur	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
HaC2: Homewood	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
HaD2: Homewood	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
JtA: Jimtown	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.

TABLE 12.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
KeB Keene	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Slight	Moderate: wetness.
KeC2 Keene	Moderate: slope, wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: wetness, slope.
Km Killbuck	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
LaC Lakin	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope, droughty.
LcD: Lakin	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Alford	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
Lk Lindside	Severe: flooding.	Moderate: wetness.	Moderate: wetness, flooding.	Moderate: wetness.	Moderate: flooding.
Lm Lobdell	Severe: flooding.	Moderate: wetness.	Moderate: wetness, flooding.	Slight	Moderate: flooding.
Lo Lorain	Severe: ponding, too clayey.	Severe: ponding, too clayey.	Severe: too clayey, ponding.	Severe: ponding, too clayey.	Severe: ponding, too clayey.
LpC2 Lowell	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
LpD2 Lowell	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
LrE2, LrF: Lowell	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
Gilpin	Severe: slope.	Severe: slope.	Severe: small stones, slope.	Severe: slope.	Severe: slope.
Lu Luray	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
MaB Markland	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight	Slight.

TABLE 12.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
MbC2: Markland	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
McD2:					
Markland	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
Glenford	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
MdA: McGary	Severe: wetness, percs slowly.	Severe: percs slowly.	Severe: wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.
Me: Melvin	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness, flooding.
MkD: Mertz	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
MrB: Morristown	Moderate: slope, small stones, percs slowly.	Moderate: slope, small stones, percs slowly.	Severe: slope, small stones.	Slight	Severe: droughty.
MrD: Morristown	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: droughty, slope.
MrF: Morristown	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: droughty, slope.
MsB: Morristown	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, small stones, percs slowly.	Severe: erodes easily.	Moderate: droughty.
MsC: Morristown	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: droughty, slope.
MsD: Morristown	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
MsE: Morristown	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
Ne: Newark	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness, erodes easily.	Severe: wetness, flooding.
No: Nolin	Severe: flooding.	Slight	Moderate: flooding.	Slight	Moderate: flooding.

TABLE 12.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
OmB Omulga	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Slight	Slight.
OmC Omulga	Moderate: slope, wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
RaB Rawson	Severe: percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Slight	Slight.
RfC Rigley	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: large stones, slope.
RgD Rigley	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
RhE:					
Rigley	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
Coshocton	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
RoF Rodman	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: droughty, slope.
Se Sebring	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
St Stonelick	Severe: flooding.	Slight	Moderate: small stones, flooding.	Slight	Moderate: flooding.
Ta Tioga	Severe: flooding.	Slight	Slight	Severe: erodes easily.	Moderate: droughty.
Tf Tioga	Severe: flooding.	Slight	Moderate: flooding.	Severe: erodes easily.	Moderate: flooding.
Ud, Ug, Uh. Udorthents					
Uk: Udorthents.					
Pits.					
UsB: Urban land.					

TABLE 12.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
UsB: Glenford	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Moderate: wetness.	Slight.
UtA: Urban land.					
Nolin	Severe: flooding.	Slight	Slight	Slight	Slight.
UvB: Urban land.					
Watertown	Slight	Slight	Severe: slope.	Slight	Moderate: droughty.
UwC: Urban land.					
Wellston	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
WaB Watertown	Slight	Slight	Moderate: slope, small stones.	Slight	Moderate: droughty.
WaC Watertown	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: droughty, slope.
WhB Wellston	Slight	Slight	Moderate: slope.	Slight	Slight.
WhC2 Wellston	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
WmB Westgate	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Slight	Slight.
WmC2 Westgate	Moderate: slope, wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
WtC2 Westmoreland	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
WtD2 Westmoreland	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
WtE Westmoreland	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
WuC2: Westmoreland	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.

TABLE 12.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
WuC2:					
Guernsey	Moderate: slope, wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope, wetness.
WuD2:					
Westmoreland	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
Guernsey	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
WuE2:					
Westmoreland	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
Guernsey	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
WvD:					
Westmoreland	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
Urban land.					
ZnB Zanesville	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: erodes easily.	Slight.
ZnC2 Zanesville	Moderate: slope, wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.

TABLE 13.--WILDLIFE HABITAT

(See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
AaB---------------- Aaron	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
AaC2--------------- Aaron	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
AaD2--------------- Aaron	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
AcB: Aaron--------------	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Upshur-------------	Fair	Good	Fair	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
AfB---------------- Alford	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
AfC2--------------- Alford	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
BeB---------------- Berks	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.
BeD2--------------- Berks	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.
BeE---------------- Berks	Very poor.	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
BkF: Berks--------------	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Westmoreland-------	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
BoB, BoD, BpF------ Bethesda	Very poor.	Very poor.	Poor	Poor	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.
BsC2--------------- Brookside	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
BsE---------------- Brookside	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Cb----------------- Chagrin	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
CcA, CcB----------- Chavies	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Poor.
CeA---------------- Chili	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.

TABLE 13.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
CeB---------------- Chili	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
ChA---------------- Chili	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
ChB, ChC----------- Chili	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
CkA---------------- Cidermill	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
CnB---------------- Cincinnati	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
CnC2--------------- Cincinnati	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
CpC2--------------- Clarksburg	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
CrC:										
Claysville---------	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Guernsey----------	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
CsC2--------------- Coshocton	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
CsD---------------- Coshocton	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
CtE:										
Coshocton---------	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Westmoreland------	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Ds. Dumps and Pits										
FaB---------------- Fairpoint	Fair	Fair	Fair	Fair	Fair	Poor	Very poor.	Fair	Fair	Very poor.
FaD---------------- Fairpoint	Poor	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
FaE---------------- Fairpoint	Very poor.	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Poor	Very poor.
FbF---------------- Fairpoint	Very poor.	Very poor.	Poor	Poor	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.
FcA---------------- Fitchville	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.

TABLE 13.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
FcB---------------- Fitchville	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
FkB: Frankstown Variant	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Mertz--------------	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
GdB---------------- Gilpin	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Very poor.
GdC2--------------- Gilpin	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
GeD2: Gilpin------------	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Upshur------------	Poor	Fair	Fair	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
GeE2: Gilpin------------	Very poor.	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Upshur------------	Very poor.	Fair	Fair	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
GfA---------------- Glenford	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
GfB---------------- Glenford	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
GfC2--------------- Glenford	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
GtC2: Guernsey----------	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Upshur------------	Fair	Good	Fair	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
GtD2: Guernsey----------	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Upshur------------	Poor	Fair	Fair	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
HaC2--------------- Homewood	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
HaD2--------------- Homewood	Poor	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.

TABLE 13.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
JtA Jimtown	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
KeB Keene	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
KeC2 Keene	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Km Killbuck	Fair	Fair	Fair	Fair	Fair	Good	Fair	Fair	Fair	Fair.
LaC Lakin	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.
LcD: Lakin	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.
Alford	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Lk Lindside	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Lm Lobdell	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Lo Lorain	Fair	Fair	Poor	Poor	Poor	Good	Good	Fair	Poor	Good.
LpC2 Lowell	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
LpD2 Lowell	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
LrE2: Lowell	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Gilpin	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
LrF: Lowell	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Gilpin	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Lu Luray	Fair	Fair	Poor	Poor	Poor	Good	Good	Fair	Poor	Good.
MaB Markland	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
MbC2 Markland	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.

TABLE 13.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
McD2:										
Markland----------	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Glenford----------	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
MdA---------------- McGary	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Me----------------- Melvin	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
MkD---------------- Mertz	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
MrB, MrD, MrF------ Morristown	Very poor.	Very poor.	Poor	Poor	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.
MsB---------------- Morristown	Fair	Fair	Fair	Fair	Fair	Poor	Very poor.	Fair	Fair	Very poor.
MsC---------------- Morristown	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
MsD---------------- Morristown	Poor	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
MsE---------------- Morristown	Very poor.	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Poor	Very poor.
Ne----------------- Newark	Poor	Fair	Fair	Good	Good	Fair	Fair	Fair	Good	Fair.
No----------------- Nolin	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
OmB---------------- Omulga	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
OmC---------------- Omulga	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
RaB---------------- Rawson	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
RfC---------------- Rigley	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
RgD---------------- Rigley	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
RhE:										
Rigley------------	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Coshocton---------	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.

TABLE 13.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
RoF---------------- Rodman	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Se----------------- Sebring	Fair	Fair	Good	Good	Good	Good	Good	Fair	Good	Good.
St----------------- Stonelick	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Ta, Tf------------- Tioga	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Ud, Ug, Uh. Udorthents										
Uk: Udorthents.										
Pits.										
UsB: Urban land.										
Glenford----------	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
UtA: Urban land.										
Nolin-------------	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
UvB: Urban land.										
Watertown---------	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
UwC: Urban land.										
Wellston----------	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
WaB---------------- Watertown	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Very poor.
WaC---------------- Watertown	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
WhB---------------- Wellston	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
WhC2--------------- Wellston	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
WmB---------------- Westgate	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.

TABLE 13.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
WmC2---------------- Westgate	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
WtC2---------------- Westmoreland	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
WtD2---------------- Westmoreland	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
WtE----------------- Westmoreland	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
WuC2:										
Westmoreland------	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Guernsey----------	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
WuD2:										
Westmoreland------	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Guernsey----------	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
WuE2:										
Westmoreland------	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Guernsey----------	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
WvD:										
Westmoreland------	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Urban land.										
ZnB----------------- Zanesville	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
ZnC2---------------- Zanesville	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.

TABLE 14.--BUILDING SITE DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
AaB Aaron	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Moderate: wetness.
AaC2 Aaron	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength.	Moderate: wetness, slope.
AaD2 Aaron	Severe: wetness, slope.	Severe: shrink-swell, slope, slippage.	Severe: wetness, slope, shrink-swell, slippage.	Severe: shrink-swell, slope, slippage.	Severe: shrink-swell, low strength, slope, slippage.	Severe: slope.
AcB:						
Aaron	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Moderate: wetness.
Upshur	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Slight.
AfB Alford	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength, frost action.	Slight.
AfC2 Alford	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength, frost action.	Moderate: slope.
BeB Berks	Moderate: depth to rock.	Slight	Moderate: depth to rock.	Moderate: slope.	Slight	Severe: small stones.
BeD2, BeE Berks	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, small stones.
BkF:						
Berks	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, small stones.
Westmoreland	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
BoB Bethesda	Moderate: dense layer, large stones, slope.	Severe: unstable fill.	Severe: unstable fill.	Severe: slope, unstable fill.	Severe: unstable fill.	Severe: droughty.
BoD Bethesda	Severe: slope.	Severe: slope, unstable fill.	Severe: slope, unstable fill.	Severe: slope, unstable fill.	Severe: slope, unstable fill.	Severe: droughty, slope.

TABLE 14.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
BpF Bethesda	Severe: slope.	Severe: slope, unstable fill.	Severe: slope, unstable fill.	Severe: slope, unstable fill.	Severe: slope, unstable fill.	Severe: large stones, droughty, slope.
BsC2 Brookside	Moderate: too clayey, wetness, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: slope, shrink-swell, slippage.	Severe: low strength, shrink-swell.	Moderate: slope.
BsE Brookside	Severe: slope, slippage.	Severe: slope, shrink-swell, slippage.	Severe: slope, shrink-swell, slippage.	Severe: slope, shrink-swell, slippage.	Severe: slope, slippage, shrink-swell.	Severe: slope.
Cb Chagrin	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding, frost action.	Slight.
CcA Chavies	Slight	Slight	Slight	Slight	Slight	Slight.
CcB Chavies	Slight	Slight	Slight	Moderate: slope.	Slight	Slight.
CeA Chili	Severe: cutbanks cave.	Slight	Slight	Slight	Moderate: frost action.	Moderate: droughty.
CeB Chili	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Moderate: frost action.	Moderate: droughty.
ChA Chili	Severe: cutbanks cave.	Slight	Slight	Slight	Moderate: frost action.	Moderate: small stones, droughty.
ChB Chili	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Moderate: frost action.	Moderate: small stones, droughty.
ChC Chili	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: small stones, droughty, slope.
CkA Cidermill	Severe: cutbanks cave.	Slight	Slight	Slight	Moderate: low strength, frost action.	Slight.
CnB Cincinnati	Moderate: dense layer, wetness.	Slight	Moderate: wetness.	Moderate: slope.	Severe: low strength, frost action.	Slight.
CnC2 Cincinnati	Moderate: dense layer, wetness, slope.	Moderate: slope.	Moderate: wetness, slope.	Severe: slope.	Severe: low strength, frost action.	Moderate: slope.
CpC2 Clarksburg	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: wetness.	Severe: slope.	Moderate: low strength, wetness, slope.	Moderate: wetness, slope.

TABLE 14.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
CrC:						
Claysville	Severe: wetness, slope, slippage.	Severe: wetness, shrink-swell, slippage.	Severe: wetness, shrink-swell, slippage.	Severe: wetness, shrink-swell, slippage.	Severe: shrink-swell, low strength, slippage.	Moderate: wetness, slope.
Guernsey	Severe: wetness, slippage.	Severe: shrink-swell, slippage.	Severe: wetness, shrink-swell, slippage.	Severe: slope, shrink-swell, slippage.	Severe: shrink-swell, low strength, slippage.	Moderate: slope, wetness.
CsC2 Coshocton	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: wetness.	Severe: slope.	Severe: low strength, frost action.	Moderate: wetness, slope.
CsD Coshocton	Severe: wetness, slope.	Severe: slope.	Severe: wetness, slope.	Severe: slope.	Severe: low strength, slope, frost action.	Severe: slope.
CtE:						
Coshocton	Severe: wetness, slope.	Severe: slope.	Severe: wetness, slope.	Severe: slope.	Severe: low strength, slope, frost action.	Severe: slope.
Westmoreland	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Ds. Dumps and Pits						
FaB Fairpoint	Slight	Severe: unstable fill.	Severe: unstable fill.	Severe: unstable fill.	Severe: unstable fill.	Severe: droughty.
FaD, FaE Fairpoint	Severe: slope.	Severe: slope, unstable fill.	Severe: slope, unstable fill.	Severe: slope, unstable fill.	Severe: slope, unstable fill.	Severe: droughty, slope.
FbF Fairpoint	Severe: slope.	Severe: slope, unstable fill.	Severe: slope, unstable fill.	Severe: slope, unstable fill.	Severe: slope, unstable fill.	Severe: small stones, droughty, slope.
FcA, FcB Fitchville	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action.	Moderate: wetness.
FkB:						
Frankstown Variant	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: slope, depth to rock.	Moderate: depth to rock, low strength, frost action.	Moderate: large stones, thin layer, area reclaim.
Mertz	Slight	Slight	Slight	Moderate: slope.	Moderate: low strength, frost action.	Moderate: small stones.

TABLE 14.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
GdB--------------- Gilpin	Moderate: depth to rock.	Slight---------	Moderate: depth to rock.	Moderate: slope.	Moderate: frost action.	Moderate: thin layer.
GdC2-------------- Gilpin	Moderate: slope, depth to rock.	Moderate: slope.	Moderate: slope, depth to rock.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope, thin layer.
GeD2, GeE2:						
Gilpin-----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Upshur-----------	Severe: slope, slippage.	Severe: slope, shrink-swell, slippage.	Severe: slope, shrink-swell, slippage.	Severe: slope, shrink-swell, slippage.	Severe: slope, shrink-swell, low strength.	Severe: slope.
GfA--------------- Glenford	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: low strength, frost action.	Slight.
GfB--------------- Glenford	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: low strength, frost action.	Slight.
GfC2-------------- Glenford	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: wetness.	Severe: slope.	Severe: low strength, frost action.	Moderate: slope.
GtC2:						
Guernsey---------	Severe: wetness, slippage.	Severe: shrink-swell, slippage.	Severe: wetness, shrink-swell, slippage.	Severe: slope, shrink-swell, slippage.	Severe: shrink-swell, low strength.	Moderate: slope, wetness.
Upshur-----------	Moderate: too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: slope, shrink-swell, slippage.	Severe: shrink-swell, low strength.	Moderate: slope.
GtD2:						
Guernsey---------	Severe: wetness, slope, slippage.	Severe: slope, slippage, shrink-swell.	Severe: wetness, slope, shrink-swell.	Severe: slope, slippage, shrink-swell.	Severe: shrink-swell, low strength, slope.	Severe: slope.
Upshur-----------	Severe: slope, slippage.	Severe: slope, shrink-swell, slippage.	Severe: slope, shrink-swell, slippage.	Severe: slope, shrink-swell, slippage.	Severe: slope, shrink-swell, low strength.	Severe: slope.
HaC2-------------- Homewood	Moderate: dense layer, wetness, slope.	Moderate: shrink-swell, slope.	Moderate: wetness, slope, shrink-swell.	Severe: slope.	Moderate: shrink-swell, low strength, slope.	Moderate: slope.
HaD2-------------- Homewood	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

TABLE 14.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
JtA---------------- Jimtown	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action.	Moderate: wetness.
KeB---------------- Keene	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: low strength, frost action.	Moderate: wetness.
KeC2--------------- Keene	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: wetness.	Severe: slope.	Severe: low strength, frost action.	Moderate: wetness, slope.
Km----------------- Killbuck	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness, low strength.	Severe: wetness.
LaC---------------- Lakin	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope, droughty.
LcD: Lakin-------------	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Alford------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope, frost action.	Severe: slope.
Lk----------------- Lindside	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
Lm----------------- Lobdell	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding, frost action.	Moderate: flooding.
Lo----------------- Lorain	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: shrink-swell, low strength, ponding.	Severe: ponding, too clayey.
LpC2--------------- Lowell	Moderate: depth to rock, too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: wetness, depth to rock, slope.	Severe: slope.	Severe: low strength.	Moderate: slope.
LpD2--------------- Lowell	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.

TABLE 14.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
LrE2, LrF:						
Lowell	Severe: slope.	Severe: slope, slippage.	Severe: slope, slippage.	Severe: slope, slippage.	Severe: low strength, slope, slippage.	Severe: slope.
Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Lu Luray	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: low strength, ponding, frost action.	Severe: ponding.
MaB Markland	Moderate: too clayey, wetness.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Slight.
MbC2 Markland	Moderate: too clayey, wetness, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength.	Moderate: slope.
McD2:						
Markland	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength, slope.	Severe: slope.
Glenford	Severe: wetness, slope.	Severe: slope.	Severe: wetness, slope.	Severe: slope.	Severe: low strength, slope, frost action.	Severe: slope.
MdA McGary	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell, low strength.	Moderate: wetness.
Me Melvin	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: wetness, flooding.
MkD Mertz	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
MrB Morristown	Moderate: dense layer, slope.	Severe: unstable fill.	Severe: unstable fill.	Severe: slope, unstable fill.	Severe: unstable fill.	Severe: droughty.
MrD, MrF Morristown	Severe: slope.	Severe: slope, unstable fill.	Severe: slope, unstable fill.	Severe: slope, unstable fill.	Severe: slope, unstable fill.	Severe: droughty, slope.
MsB Morristown	Moderate: dense layer.	Severe: unstable fill.	Severe: unstable fill.	Severe: unstable fill.	Severe: unstable fill.	Moderate: droughty.
MsC Morristown	Moderate: dense layer, slope.	Severe: unstable fill.	Severe: unstable fill.	Severe: slope, unstable fill.	Severe: unstable fill.	Moderate: droughty, slope.

TABLE 14.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
MsD, MsE---------- Morristown	Severe: slope.	Severe: slope, unstable fill.	Severe: slope, unstable fill.	Severe: slope, unstable fill.	Severe: slope, unstable fill.	Severe: slope.
Ne---------------- Newark	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: wetness, flooding.
No---------------- Nolin	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength, flooding.	Moderate: flooding.
OmB--------------- Omulga	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: low strength, frost action.	Slight.
OmC--------------- Omulga	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: wetness.	Severe: slope.	Severe: low strength, frost action.	Moderate: slope.
RaB--------------- Rawson	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: slope, wetness.	Moderate: frost action, wetness.	Slight.
RfC--------------- Rigley	Moderate: slope, cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: large stones, slope.
RgD--------------- Rigley	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
RhE:						
Rigley-----------	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Coshocton--------	Severe: wetness, slope.	Severe: slope.	Severe: wetness, slope.	Severe: slope.	Severe: low strength, slope, frost action.	Severe: slope.
RoF--------------- Rodman	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: droughty, slope.
Se---------------- Sebring	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: low strength, ponding, frost action.	Severe: ponding.
St---------------- Stonelick	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
Ta---------------- Tioga	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding, frost action.	Moderate: droughty.

TABLE 14.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
Tf----------------- Tioga	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
Ud, Ug, Uh. Udorthents						
Uk: Udorthents.						
Pits.						
UsB: Urban land.						
Glenford----------	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: low strength, frost action.	Slight.
UtA: Urban land.						
Nolin-------------	Moderate: wetness.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength.	Slight.
UvB: Urban land.						
Watertown---------	Severe: cutbanks cave.	Slight----------	Slight----------	Moderate: slope.	Moderate: frost action.	Moderate: droughty.
UwC: Urban land.						
Wellston----------	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: frost action.	Moderate: slope.
WaB---------------- Watertown	Severe: cutbanks cave.	Slight----------	Slight----------	Moderate: slope.	Moderate: frost action.	Moderate: droughty.
WaC---------------- Watertown	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: droughty, slope.
WhB---------------- Wellston	Slight----------	Slight----------	Slight----------	Moderate: slope.	Severe: frost action.	Slight.
WhC2--------------- Wellston	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: frost action.	Moderate: slope.
WmB---------------- Westgate	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: low strength, frost action.	Slight.
WmC2--------------- Westgate	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: wetness.	Severe: slope.	Severe: low strength, frost action.	Moderate: slope.

TABLE 14.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
WtC2 Westmoreland	Moderate: depth to rock, slope.	Moderate: slope.	Moderate: depth to rock, slope.	Severe: slope.	Moderate: low strength, slope, frost action.	Moderate: slope.
WtD2, WtE Westmoreland	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
WuC2: Westmoreland	Moderate: depth to rock, slope.	Moderate: slope.	Moderate: depth to rock, slope.	Severe: slope.	Moderate: low strength, slope, frost action.	Moderate: slope.
Guernsey	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: slope, shrink-swell.	Severe: shrink-swell, low strength.	Moderate: slope, wetness.
WuD2, WuE2: Westmoreland	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Guernsey	Severe: wetness, slope, slippage.	Severe: slope, slippage, shrink-swell.	Severe: wetness, slope, shrink-swell.	Severe: slope, slippage, shrink-swell.	Severe: shrink-swell, low strength, slope.	Severe: slope.
WvD: Westmoreland	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Urban land.						
ZnB Zanesville	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Severe: low strength, frost action.	Slight.
ZnC2 Zanesville	Severe: wetness.	Moderate: wetness, slope.	Severe: wetness.	Severe: slope.	Severe: low strength, frost action.	Moderate: slope.

TABLE 15.--SANITARY FACILITIES

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "good," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
AaB Aaron	Severe: wetness, percs slowly.	Moderate: depth to rock, slope.	Severe: depth to rock, wetness.	Moderate: depth to rock, wetness.	Poor: too clayey, hard to pack.
AaC2 Aaron	Severe: wetness, percs slowly.	Severe: slope.	Severe: depth to rock, wetness.	Moderate: depth to rock, wetness, slope.	Poor: too clayey, hard to pack.
AaD2 Aaron	Severe: wetness, percs slowly, slope.	Severe: slope.	Severe: depth to rock, wetness, slope.	Severe: slope.	Poor: too clayey, hard to pack, slope.
AcB:					
Aaron	Severe: wetness, percs slowly.	Moderate: depth to rock, slope.	Severe: depth to rock, wetness.	Moderate: depth to rock, wetness.	Poor: too clayey, hard to pack.
Upshur	Severe: percs slowly.	Moderate: slope, depth to rock.	Severe: too clayey, depth to rock.	Moderate: depth to rock.	Poor: too clayey, hard to pack.
AfB Alford	Slight	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey.
AfC2 Alford	Moderate: slope.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, slope.
BeB Berks	Severe: depth to rock.	Severe: seepage, depth to rock.	Severe: depth to rock, seepage.	Severe: seepage, depth to rock.	Poor: small stones, area reclaim.
BeD2, BeE Berks	Severe: depth to rock, slope.	Severe: slope, seepage, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: seepage, slope, depth to rock.	Poor: small stones, slope, area reclaim.
BkF:					
Berks	Severe: depth to rock, slope.	Severe: slope, seepage, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: seepage, slope, depth to rock.	Poor: small stones, slope, area reclaim.
Westmoreland	Severe: slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: small stones, slope.
BoB Bethesda	Severe: percs slowly, unstable fill.	Severe: slope, unstable fill.	Severe: unstable fill.	Severe: unstable fill.	Poor: small stones.

TABLE 15.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
BoD, BpF: Bethesda	Severe: percs slowly, slope, unstable fill.	Severe: slope, unstable fill.	Severe: slope, unstable fill.	Severe: slope, unstable fill.	Poor: small stones, slope.
BsC2: Brookside	Severe: percs slowly, wetness.	Severe: slope, wetness.	Severe: too clayey.	Moderate: slope, wetness.	Poor: too clayey, hard to pack.
BsE: Brookside	Severe: slope, percs slowly, wetness.	Severe: slope, wetness, slippage.	Severe: slope, too clayey, slippage.	Severe: slope, slippage.	Poor: slope, too clayey, hard to pack.
Cb: Chagrin	Moderate: flooding, wetness, percs slowly.	Moderate: seepage.	Severe: wetness.	Moderate: flooding, wetness.	Fair: thin layer.
CcA, CcB: Chavies	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Good.
CeA, CeB, ChA, ChB: Chili	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: too clayey, small stones.
ChC: Chili	Moderate: slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Fair: too clayey, small stones, slope.
CkA: Cidermill	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: too clayey, thin layer.
CnB: Cincinnati	Severe: wetness, percs slowly.	Moderate: slope.	Moderate: wetness, too clayey.	Moderate: wetness.	Fair: too clayey, wetness.
CnC2: Cincinnati	Severe: wetness, percs slowly.	Severe: slope.	Moderate: wetness, slope, too clayey.	Moderate: wetness, slope.	Fair: too clayey, slope, wetness.
CpC2: Clarksburg	Severe: wetness, percs slowly.	Severe: slope, wetness.	Severe: wetness.	Moderate: wetness, slope.	Fair: slope, small stones.
CrC:					
Claysville	Severe: wetness, percs slowly, slippage.	Severe: slope, slippage.	Severe: wetness, too clayey.	Severe: wetness, slippage.	Poor: too clayey, hard to pack.
Guernsey	Severe: wetness, percs slowly.	Severe: slope, wetness.	Severe: seepage, too clayey.	Moderate: wetness, slope.	Poor: too clayey, hard to pack.
CsC2: Coshocton	Severe: wetness, percs slowly.	Severe: slope, wetness.	Severe: seepage, wetness.	Moderate: wetness, slope.	Poor: too clayey, hard to pack.

TABLE 15.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
CsD----------------- Coshocton	Severe: wetness, percs slowly, slope.	Severe: slope, wetness.	Severe: seepage, wetness, slope.	Severe: slope.	Poor: too clayey, hard to pack, slope.
CtE:					
Coshocton----------	Severe: wetness, percs slowly, slope.	Severe: slope, wetness.	Severe: seepage, wetness, slope.	Severe: slope.	Poor: too clayey, hard to pack, slope.
Westmoreland-------	Severe: slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: small stones, slope.
Ds. Dumps and Pits					
FaB----------------- Fairpoint	Severe: percs slowly, unstable fill.	Severe: unstable fill.	Severe: unstable fill.	Severe: unstable fill.	Poor: small stones.
FaD, FaE, FbF------- Fairpoint	Severe: percs slowly, slope, unstable fill.	Severe: slope, unstable fill.	Severe: slope, unstable fill.	Severe: slope, unstable fill.	Poor: small stones, slope.
FcA, FcB------------ Fitchville	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
FkB:					
Frankstown Variant-	Severe: depth to rock.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Moderate: seepage.	Poor: area reclaim, thin layer.
Mertz--------------	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey, large stones.	Slight-----------	Poor: small stones.
GdB----------------- Gilpin	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, thin layer.
GdC2---------------- Gilpin	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, thin layer.
GeD2, GeE2:					
Gilpin-------------	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Poor: slope, area reclaim, thin layer.
Upshur-------------	Severe: slope, percs slowly, slippage.	Severe: slope.	Severe: slope, too clayey, depth to rock.	Severe: slope, slippage.	Poor: slope, too clayey, hard to pack.

TABLE 15.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
GfA, GfB Glenford	Severe: wetness, percs slowly.	Severe: wetness.	Moderate: wetness, too clayey.	Moderate: wetness.	Fair: too clayey, wetness.
GfC2 Glenford	Severe: wetness, percs slowly.	Severe: slope, wetness.	Moderate: wetness, slope, too clayey.	Moderate: wetness, slope.	Fair: too clayey, slope, wetness.
GtC2:					
Guernsey	Severe: wetness, percs slowly.	Severe: slope, wetness.	Severe: seepage, too clayey.	Moderate: wetness, slope.	Poor: too clayey, hard to pack.
Upshur	Severe: percs slowly.	Severe: slope.	Severe: too clayey, depth to rock.	Moderate: depth to rock, slope.	Poor: too clayey, hard to pack.
GtD2:					
Guernsey	Severe: wetness, percs slowly, slope.	Severe: slope, wetness.	Severe: seepage, slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
Upshur	Severe: slope, percs slowly, slippage.	Severe: slope.	Severe: slope, too clayey, depth to rock.	Severe: slope, slippage.	Poor: slope, too clayey, hard to pack.
HaC2 Homewood	Severe: wetness, percs slowly.	Severe: slope.	Moderate: wetness, slope, too clayey.	Moderate: wetness, slope.	Fair: too clayey, small stones, slope.
HaD2 Homewood	Severe: wetness, percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
JtA Jimtown	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: too sandy, small stones, wetness.
KeB Keene	Severe: wetness, percs slowly.	Severe: wetness.	Severe: seepage, wetness.	Moderate: wetness.	Poor: too clayey, hard to pack.
KeC2 Keene	Severe: wetness, percs slowly.	Severe: slope, wetness.	Severe: seepage, wetness.	Moderate: wetness, slope.	Poor: too clayey, hard to pack.
Km Killbuck	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
LaC Lakin	Severe: poor filter.	Severe: slope, seepage.	Severe: seepage.	Severe: seepage.	Poor: seepage.

TABLE 15.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
LcD: Lakin	Severe: slope, poor filter.	Severe: slope, seepage.	Severe: slope, seepage.	Severe: slope, seepage.	Poor: slope, seepage.
Alford	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Lk Lindside	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Fair: too clayey, wetness.
Lm Lobdell	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: small stones.
Lo Lorain	Severe: ponding, percs slowly.	Slight	Severe: ponding, too clayey.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
LpC2 Lowell	Severe: wetness, percs slowly.	Severe: slope, wetness.	Severe: depth to rock, too clayey.	Moderate: depth to rock, wetness, slope.	Poor: too clayey, hard to pack.
LpD2 Lowell	Severe: wetness, percs slowly, slope.	Severe: slope, wetness.	Severe: depth to rock, slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
LrE2, LrF: Lowell	Severe: percs slowly, slope.	Severe: slope.	Severe: depth to rock, slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
Gilpin	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Poor: slope, area reclaim, thin layer.
Lu Luray	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Poor: ponding.
MaB Markland	Severe: wetness, percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
MbC2 Markland	Severe: wetness, percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
McD2: Markland	Severe: wetness, percs slowly, slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.

TABLE 15.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
McD2:					
Glenford	Severe: wetness, percs slowly, slope.	Severe: slope, wetness.	Severe: slope.	Severe: slope.	Poor: slope.
MdA McGary	Severe: wetness, percs slowly.	Slight	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
Me Melvin	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
MkD Mertz	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: small stones, slope.
MrB Morristown	Severe: percs slowly, unstable fill.	Severe: slope, unstable fill.	Severe: unstable fill.	Severe: unstable fill.	Poor: small stones.
MrD, MrF Morristown	Severe: percs slowly, slope, unstable fill.	Severe: slope, unstable fill.	Severe: slope, unstable fill.	Severe: slope, unstable fill.	Poor: small stones, slope.
MsB Morristown	Severe: percs slowly, unstable fill.	Severe: unstable fill.	Severe: unstable fill.	Severe: unstable fill.	Poor: small stones.
MsC Morristown	Severe: percs slowly, unstable fill.	Severe: slope, unstable fill.	Severe: unstable fill.	Severe: unstable fill.	Poor: small stones.
MsD, MsE Morristown	Severe: percs slowly, slope, unstable fill.	Severe: slope, unstable fill.	Severe: slope, unstable fill.	Severe: slope, unstable fill.	Poor: small stones, slope.
Ne Newark	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
No Nolin	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Fair: too clayey.
OmB Omulga	Severe: wetness, percs slowly.	Severe: wetness.	Moderate: wetness, too clayey.	Moderate: wetness.	Fair: too clayey, wetness.
OmC Omulga	Severe: wetness, percs slowly.	Severe: slope, wetness.	Moderate: wetness, slope, too clayey.	Moderate: wetness, slope.	Fair: too clayey, slope, wetness.
RaB Rawson	Severe: wetness, percs slowly.	Moderate: seepage, slope.	Severe: too clayey.	Moderate: wetness.	Poor: too clayey, hard to pack.

TABLE 15.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
RfC------------------ Rigley	Moderate: slope, poor filter.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Fair: small stones, slope.
RgD------------------ Rigley	Severe: slope, poor filter.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: slope.
RhE:					
Rigley---------------	Severe: slope, poor filter.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: slope.
Coshocton-----------	Severe: wetness, percs slowly, slope.	Severe: slope, wetness.	Severe: seepage, wetness, slope.	Severe: slope.	Poor: too clayey, hard to pack, slope.
RoF------------------ Rodman	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, small stones.
Se------------------- Sebring	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Poor: ponding.
St------------------- Stonelick	Severe: flooding.	Severe: seepage, flooding.	Severe: flooding, seepage.	Severe: flooding, seepage.	Poor: seepage.
Ta------------------- Tioga	Severe: poor filter, wetness.	Severe: flooding, seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: thin layer.
Tf------------------- Tioga	Severe: flooding, wetness, poor filter.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: thin layer.
Ud, Ug, Uh. Udorthents					
Uk: Udorthents.					
Pits.					
UsB: Urban land.					
Glenford------------	Severe: wetness, percs slowly.	Severe: wetness.	Moderate: wetness, too clayey.	Moderate: wetness.	Fair: too clayey, wetness.
UtA: Urban land.					

TABLE 15.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
UtA:					
Nolin	Moderate: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey.
UvB:					
Urban land.					
Watertown	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
UwC:					
Urban land.					
Wellston	Moderate: thin layer, seepage, slope.	Severe: slope.	Severe: seepage.	Moderate: slope.	Fair: area reclaim, too clayey, slope.
WaB Watertown	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
WaC Watertown	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
WhB Wellston	Moderate: thin layer, seepage.	Moderate: seepage, slope.	Severe: seepage.	Slight	Fair: area reclaim, too clayey.
WhC2 Wellston	Moderate: thin layer, seepage, slope.	Severe: slope.	Severe: seepage.	Moderate: slope.	Fair: area reclaim, too clayey, slope.
WmB Westgate	Severe: wetness, percs slowly.	Moderate: seepage, slope.	Severe: depth to rock.	Moderate: wetness.	Poor: thin layer.
WmC2 Westgate	Severe: wetness, percs slowly.	Severe: slope.	Severe: depth to rock.	Moderate: wetness, slope.	Poor: thin layer.
WtC2 Westmoreland	Moderate: slope, depth to rock, percs slowly.	Severe: slope.	Severe: depth to rock.	Moderate: slope, depth to rock.	Poor: small stones.
WtD2, WtE Westmoreland	Severe: slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: small stones, slope.

TABLE 15.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
WuC2:					
Westmoreland-------	Moderate: slope, depth to rock, percs slowly.	Severe: slope.	Severe: depth to rock.	Moderate: slope, depth to rock.	Poor: small stones.
Guernsey-----------	Severe: wetness, percs slowly.	Severe: slope, wetness.	Severe: seepage, too clayey.	Moderate: wetness, slope.	Poor: too clayey, hard to pack.
WuD2, WuE2:					
Westmoreland-------	Severe: slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: small stones, slope.
Guernsey-----------	Severe: wetness, percs slowly, slope.	Severe: slope, wetness.	Severe: seepage, slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
WvD:					
Westmoreland-------	Severe: slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: small stones, slope.
Urban land.					
ZnB----------------- Zanesville	Severe: wetness, percs slowly.	Severe: wetness.	Severe: depth to rock.	Moderate: depth to rock, wetness.	Poor: small stones.
ZnC2---------------- Zanesville	Severe: wetness, percs slowly.	Severe: slope, wetness.	Severe: depth to rock.	Moderate: depth to rock, wetness, slope.	Poor: small stones.

TABLE 16.--CONSTRUCTION MATERIALS

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
AaB, AaC2 Aaron	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
AaD2 Aaron	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
AcB:				
Aaron	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Upshur	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
AfB Alford	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
AfC2 Alford	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
BeB Berks	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
BeD2 Berks	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
BeE Berks	Poor: slope, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
BkF:				
Berks	Poor: slope, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Westmoreland	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
BoB Bethesda	Fair: large stones.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
BoD Bethesda	Fair: large stones, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.

TABLE 16.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
BpF Bethesda	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
BsC2 Brookside	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
BsE Brookside	Poor: slope, low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones, area reclaim.
Cb Chagrin	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
CcA, CcB Chavies	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, area reclaim.
CeA, CeB, ChA, ChB, ChC Chili	Good	Probable	Probable	Poor: small stones, area reclaim.
CkA Cidermill	Good	Probable	Probable	Poor: area reclaim.
CnB Cincinnati	Fair: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, too clayey.
CnC2 Cincinnati	Fair: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, too clayey, slope.
CpC2 Clarksburg	Fair: wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
CrC:				
Claysville	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones.
Guernsey	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, too clayey.
CsC2 Coshocton	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
CsD Coshocton	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.

TABLE 16.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
CtE:				
Coshocton	Poor: slope, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Westmoreland	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Ds. Dumps and Pits				
FaB Fairpoint	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
FaD Fairpoint	Fair: shrink-swell, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
FaE, FbF Fairpoint	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
FcA, FcB Fitchville	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
FkB:				
Frankstown Variant	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Mertz	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
GdB, GdC2 Gilpin	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
GeD2:				
Gilpin	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
Upshur	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey.
GeE2:				
Gilpin	Poor: thin layer, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
Upshur	Poor: slope, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey.

TABLE 16.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
GfA, GfB Glenford	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
GfC2 Glenford	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
GtC2:				
Guernsey	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, too clayey.
Upshur	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
GtD2:				
Guernsey	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope, too clayey.
Upshur	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey.
HaC2 Homewood	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, too clayey, slope.
HaD2 Homewood	Fair: wetness, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
JtA Jimtown	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
KeB, KeC2 Keene	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, area reclaim.
Km Killbuck	Poor: wetness, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
LaC Lakin	Good	Probable	Improbable: excess fines.	Fair: too sandy, slope.
LcD:				
Lakin	Severe: slope, seepage.	Probable	Improbable: excess fines.	Poor: slope.
Alford	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.

TABLE 16.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Lk-------------------- Lindside	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
Lm-------------------- Lobdell	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
Lo-------------------- Lorain	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
LpC2------------------ Lowell	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.
LpD2------------------ Lowell	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope.
LrE2, LrF:				
Lowell----------------	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, slope.
Gilpin----------------	Poor: thin layer, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
Lu-------------------- Luray	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
MaB, MbC2------------- Markland	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
McD2:				
Markland-------------	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
Glenford-------------	Fair: low strength, wetness, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
MdA------------------- McGary	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Me-------------------- Melvin	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
MkD------------------- Mertz	Poor: slope, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.

TABLE 16.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
MrB Morristown	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
MrD Morristown	Fair: shrink-swell, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
MrF Morristown	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
MsB, MsC Morristown	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
MsD Morristown	Fair: shrink-swell, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
MsE Morristown	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
Ne Newark	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
No Nolin	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
OmB Omulga	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
OmC Omulga	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, slope.
RaB Rawson	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, thin layer.
RfC Rigley	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, slope.
RgD Rigley	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
RhE: Rigley	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Coshocton	Poor: slope, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.

TABLE 16.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
RoF Rodman	Poor: slope.	Probable	Probable	Poor: too sandy, small stones, area reclaim.
Se Sebring	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
St Stonelick	Good	Probable	Improbable: too sandy.	Fair: small stones.
Ta, Tf Tioga	Good	Probable	Probable	Poor: small stones, area reclaim.
Ud, Ug, Uh. Udorthents				
Uk: Udorthents.				
Pits.				
UsB: Urban land.				
Glenford	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
UtA: Urban land.				
Nolin	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
UvB: Urban land.				
Watertown	Good	Probable	Probable	Poor: small stones, area reclaim.
UwC: Urban land.				
Wellston	Fair: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
WaB, WaC Watertown	Good	Probable	Probable	Poor: small stones, area reclaim.
WhB, WhC2 Wellston	Fair: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
WmB Westgate	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.

TABLE 16.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
WmC2------------------ Westgate	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones, slope.
WtC2------------------ Westmoreland	Fair: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
WtD2------------------ Westmoreland	Fair: area reclaim, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
WtE------------------- Westmoreland	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
WuC2:				
Westmoreland---------	Fair: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
Guernsey-------------	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, too clayey.
WuD2:				
Westmoreland---------	Fair: area reclaim, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Guernsey-------------	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope, too clayey.
WuE2:				
Westmoreland---------	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Guernsey-------------	Poor: low strength, slope, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope, too clayey.
WvD:				
Westmoreland---------	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Urban land.				
ZnB, ZnC2------------- Zanesville	Fair: area reclaim, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.

TABLE 17.--WATER MANAGEMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
AaB Aaron	Moderate: depth to rock, slope.	Severe: hard to pack.	Severe: no water.	Percs slowly, frost action, slope.	Erodes easily, wetness.	Erodes easily, percs slowly.
AaC2, AaD2 Aaron	Severe: slope.	Severe: hard to pack.	Severe: no water.	Percs slowly, frost action, slope.	Slope, erodes easily, wetness.	Slope, erodes easily, percs slowly.
AcB:						
Aaron	Moderate: depth to rock, slope.	Severe: hard to pack.	Severe: no water.	Percs slowly, frost action, slope.	Erodes easily, wetness.	Erodes easily, percs slowly.
Upshur	Moderate: depth to rock, slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Erodes easily, percs slowly.	Erodes easily, percs slowly.
AfB Alford	Moderate: seepage, slope.	Moderate: piping.	Severe: no water.	Deep to water	Erodes easily	Erodes easily.
AfC2 Alford	Severe: slope.	Moderate: piping.	Severe: no water.	Deep to water	Slope, erodes easily.	Slope, erodes easily.
BeB Berks	Severe: seepage.	Severe: seepage.	Severe: no water.	Deep to water	Depth to rock, large stones.	Droughty, depth to rock, large stones.
BeD2, BeE Berks	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Depth to rock, slope, large stones.	Droughty, depth to rock, slope.
BkF:						
Berks	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Depth to rock, slope, large stones.	Droughty, depth to rock, slope.
Westmoreland	Severe: slope.	Severe: piping.	No water	Deep to water	Slope	Slope.
BoB Bethesda	Severe: slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, large stones.	Large stones, slope, droughty.
BoD, BpF Bethesda	Severe: slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, large stones, slippage.	Large stones, slope, droughty.
BsC2 Brookside	Severe: slope.	Moderate: hard to pack, wetness, thin layer.	Severe: no water.	Slope	Slope, erodes easily.	Slope, erodes easily.

TABLE 17.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
BsE Brookside	Severe: slope, slippage.	Moderate: hard to pack, wetness, thin layer.	Severe: no water.	Slope	Slope, erodes easily, slippage.	Slope, erodes easily.
Cb Chagrin	Moderate: seepage.	Severe: piping.	Severe: cutbanks cave.	Deep to water	Favorable	Favorable.
CcA, CcB Chavies	Severe: seepage.	Severe: piping.	Severe: no water.	Deep to water	Soil blowing	Favorable.
CeA, CeB, ChA, ChB Chili	Severe: seepage.	Severe: piping.	Severe: no water.	Deep to water	Favorable	Droughty.
ChC Chili	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope	Slope, droughty.
CkA Cidermill	Severe: seepage.	Severe: piping.	Severe: no water.	Deep to water	Erodes easily	Erodes easily.
CnB Cincinnati	Moderate: seepage, slope.	Severe: thin layer.	Severe: no water.	Percs slowly, frost action, slope.	Erodes easily, wetness.	Erodes easily, rooting depth.
CnC2 Cincinnati	Severe: slope.	Severe: thin layer.	Severe: no water.	Percs slowly, frost action, slope.	Slope, erodes easily, wetness.	Slope, erodes easily, rooting depth.
CpC2 Clarksburg	Severe: slope.	Severe: piping.	Severe: no water.	Percs slowly, slope.	Slope, wetness, erodes easily.	Slope, erodes easily, rooting depth.
CrC: Claysville	Severe: slope, slippage.	Severe: hard to pack.	Severe: no water.	Percs slowly, frost action, slippage.	Slope, erodes easily, slippage.	Wetness, slope, erodes easily.
Guernsey	Severe: slope.	Severe: hard to pack.	Severe: no water.	Percs slowly, slope, frost action.	Slope, erodes easily, wetness.	Slope, erodes easily, percs slowly.
CsC2, CsD Coshocton	Severe: slope.	Moderate: thin layer, hard to pack, wetness.	Severe: no water.	Percs slowly, frost action, slope.	Slope, erodes easily, wetness.	Slope, erodes easily, percs slowly.
CtE: Coshocton	Severe: slope.	Moderate: thin layer, hard to pack, wetness.	Severe: no water.	Percs slowly, frost action, slope.	Slope, erodes easily, wetness.	Slope, erodes easily, percs slowly.
Westmoreland	Severe: slope.	Severe: piping.	No water	Deep to water	Slope	Slope.
Ds. Dumps and Pits						

TABLE 17.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
FaB---------------- Fairpoint	Moderate: slope.	Severe: piping.	Severe: no water.	Deep to water	Large stones, erodes easily.	Large stones, erodes easily.
FaD, FaE---------- Fairpoint	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, large stones, erodes easily.	Large stones, slope, erodes easily.
FbF---------------- Fairpoint	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, large stones, slippage.	Large stones, slope, droughty.
FcA---------------- Fitchville	Moderate: seepage.	Severe: piping.	Severe: no water.	Frost action---	Erodes easily, wetness.	Wetness, erodes easily.
FcB---------------- Fitchville	Moderate: seepage, slope.	Severe: piping.	Severe: no water.	Frost action, slope.	Erodes easily, wetness.	Wetness, erodes easily.
FkB:						
Frankstown Variant----------	Moderate: seepage, depth to rock, slope.	Severe: piping.	Severe: no water.	Deep to water	Depth to rock, erodes easily, area reclaim.	Erodes easily, depth to rock, area reclaim.
Mertz-------------	Moderate: slope.	Severe: piping.	Severe: no water.	Deep to water	Favorable------	Favorable.
GdB---------------- Gilpin	Moderate: seepage, depth to rock, slope.	Severe: thin layer.	Severe: no water.	Deep to water	Depth to rock, large stones.	Depth to rock, large stones.
GdC2--------------- Gilpin	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, depth to rock, large stones.	Slope, depth to rock, large stones.
GeD2, GeE2:						
Gilpin-----------	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, depth to rock, large stones.	Slope, depth to rock, large stones.
Upshur-----------	Severe: slope, slippage.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope, erodes easily, percs slowly.	Slope, erodes easily, percs slowly.
GfA---------------- Glenford	Moderate: seepage.	Severe: piping.	Severe: no water.	Frost action---	Erodes easily, wetness.	Erodes easily.
GfB---------------- Glenford	Moderate: seepage, slope.	Severe: piping.	Severe: no water.	Frost action, slope.	Erodes easily, wetness.	Erodes easily.
GfC2--------------- Glenford	Severe: slope.	Severe: piping.	Severe: no water.	Frost action, slope.	Slope, erodes easily, wetness.	Slope, erodes easily.
GtC2:						
Guernsey----------	Severe: slope.	Severe: hard to pack.	Severe: no water.	Percs slowly, slope, frost action.	Slope, erodes easily, wetness.	Slope, erodes easily, percs slowly.

TABLE 17.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
GtC2:						
Upshur-----------	Severe: slope, slippage.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope, erodes easily, percs slowly.	Slope, erodes easily, percs slowly.
GtD2:						
Guernsey---------	Severe: slope, slippage.	Severe: hard to pack.	Severe: no water.	Percs slowly, slope, frost action.	Slope, erodes easily, slippage.	Slope, erodes easily, percs slowly.
Upshur-----------	Severe: slope, slippage.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope, erodes easily, percs slowly.	Slope, erodes easily, percs slowly.
HaC2, HaD2-------- Homewood	Severe: slope.	Severe: piping.	Severe: no water.	Percs slowly, slope.	Slope, erodes easily, wetness.	Slope, erodes easily, rooting depth.
JtA--------------- Jimtown	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Frost action, cutbanks cave.	Wetness, too sandy.	Wetness.
KeB--------------- Keene	Moderate: seepage, slope.	Moderate: thin layer, piping, hard to pack.	Severe: no water.	Percs slowly, frost action, slope.	Erodes easily, wetness.	Erodes easily, percs slowly.
KeC2-------------- Keene	Severe: slope.	Moderate: thin layer, piping, hard to pack.	Severe: no water.	Percs slowly, frost action, slope.	Slope, erodes easily, wetness.	Slope, erodes easily, percs slowly.
Km---------------- Killbuck	Moderate: seepage.	Severe: wetness.	Severe: slow refill.	Flooding, frost action.	Erodes easily, wetness.	Wetness, erodes easily.
LaC--------------- Lakin	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, too sandy.	Slope, droughty.
LcD:						
Lakin------------	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, too sandy.	Slope, droughty.
Alford-----------	Severe: slope.	Moderate: piping.	Severe: no water.	Deep to water	Slope, erodes easily.	Slope, erodes easily.
Lk---------------- Lindside	Moderate: seepage.	Severe: piping.	Severe: slow refill.	Flooding, frost action.	Wetness, erodes easily.	Erodes easily.
Lm---------------- Lobdell	Severe: seepage.	Severe: piping.	Moderate: deep to water, slow refill.	Flooding, frost action.	Erodes easily, wetness.	Erodes easily.
Lo---------------- Lorain	Slight---------	Severe: hard to pack, ponding.	Severe: no water.	Ponding, percs slowly, frost action.	Ponding, percs slowly.	Wetness, percs slowly.

TABLE 17.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
LpC2, LpD2 Lowell	Severe: slope.	Severe: hard to pack.	Severe: no water.	Slope	Slope, erodes easily, wetness.	Slope, erodes easily.
LrE2, LrF:						
Lowell	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope, erodes easily.	Slope, erodes easily.
Gilpin	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, depth to rock, large stones.	Slope, depth to rock, large stones.
Lu Luray	Moderate: seepage.	Severe: piping, ponding.	Severe: slow refill.	Ponding, frost action.	Ponding	Wetness.
MaB Markland	Moderate: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Erodes easily, percs slowly.	Erodes easily, percs slowly.
MbC2 Markland	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope, erodes easily, percs slowly.	Slope, erodes easily, percs slowly.
McD2:						
Markland	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope, erodes easily, percs slowly.	Slope, erodes easily, percs slowly.
Glenford	Severe: slope.	Severe: piping.	Severe: no water.	Frost action, slope.	Slope, erodes easily, wetness.	Slope, erodes easily.
MdA McGary	Slight	Severe: wetness.	Severe: slow refill.	Percs slowly	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
Me Melvin	Moderate: seepage.	Severe: piping, wetness.	Moderate: slow refill.	Flooding	Erodes easily, wetness.	Wetness, erodes easily.
MkD Mertz	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope	Slope.
MrB, MrD, MrF Morristown	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, large stones.	Large stones, slope, droughty.
MsB Morristown	Moderate: slope.	Severe: piping.	Severe: no water.	Deep to water	Large stones, erodes easily.	Large stones, erodes easily.
MsC, MsD, MsE Morristown	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, large stones, erodes easily.	Large stones, slope, erodes easily.
Ne Newark	Moderate: seepage.	Severe: piping, wetness.	Moderate: slow refill.	Flooding, frost action.	Erodes easily, wetness.	Wetness, erodes easily.
No Nolin	Severe: seepage.	Severe: piping.	Moderate: deep to water, slow refill.	Deep to water	Erodes easily	Erodes easily.

TABLE 17.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
OmB---------------- Omulga	Moderate: seepage, slope.	Severe: piping.	Severe: no water.	Percs slowly, frost action, slope.	Erodes easily, wetness.	Erodes easily, rooting depth.
OmC---------------- Omulga	Severe: slope.	Severe: piping.	Severe: no water.	Percs slowly, frost action, slope.	Slope, erodes easily, wetness.	Slope, erodes easily, rooting depth.
RaB---------------- Rawson	Moderate: seepage, slope.	Moderate: hard to pack, wetness.	Severe: no water.	Percs slowly, slope.	Wetness---------	Percs slowly, rooting depth.
RfC, RgD---------- Rigley	Severe: seepage.	Severe: piping.	Severe: no water.	Deep to water	Slope-----------	Slope.
RhE:						
Rigley------------	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope-----------	Slope.
Coshocton---------	Severe: slope.	Moderate: thin layer, hard to pack, wetness.	Severe: no water.	Percs slowly, frost action, slope.	Slope, erodes easily, wetness.	Slope, erodes easily, percs slowly.
RoF---------------- Rodman	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, too sandy.	Slope, droughty.
Se----------------- Sebring	Moderate: seepage.	Severe: piping, ponding.	Severe: slow refill.	Ponding, frost action.	Erodes easily, ponding.	Wetness, erodes easily.
St----------------- Stonelick	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Too sandy-------	Favorable.
Ta, Tf------------- Tioga	Severe: seepage.	Severe: piping.	Severe: cutbanks cave.	Deep to water	Erodes easily	Erodes easily, droughty.
Ud, Ug, Uh. Udorthents						
Uk: Udorthents.						
Pits.						
UsB: Urban land.						
Glenford----------	Moderate: seepage, slope.	Severe: piping.	Severe: no water.	Frost action, slope.	Erodes easily, wetness.	Erodes easily.
UtA: Urban land.						
Nolin-------------	Severe: seepage.	Severe: piping.	Moderate: deep to water, slow refill.	Deep to water	Erodes easily	Erodes easily.

TABLE 17.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
UvB:						
Urban land.						
Watertown	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Too sandy, soil blowing.	Droughty.
UwC:						
Urban land.						
Wellston	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, erodes easily.	Slope, erodes easily.
WaB Watertown	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Too sandy, soil blowing.	Droughty.
WaC Watertown	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, too sandy, soil blowing.	Slope, droughty.
WhB Wellston	Moderate: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Erodes easily	Erodes easily.
WhC2 Wellston	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, erodes easily.	Slope, erodes easily.
WmB Westgate	Moderate: seepage, slope.	Moderate: piping, wetness.	Severe: no water.	Percs slowly, frost action, slope.	Erodes easily, wetness.	Erodes easily, percs slowly.
WmC2 Westgate	Severe: slope.	Moderate: piping, wetness.	Severe: no water.	Percs slowly, frost action, slope.	Slope, erodes easily, wetness.	Slope, erodes easily, percs slowly.
WtC2, WtD2, WtE Westmoreland	Severe: slope.	Severe: piping.	No water	Deep to water	Slope	Slope.
WuC2:						
Westmoreland	Severe: slope.	Severe: piping.	No water	Deep to water	Slope	Slope.
Guernsey	Severe: slope.	Severe: hard to pack.	Severe: no water.	Percs slowly, slope, frost action.	Slope, erodes easily, wetness.	Slope, erodes easily, percs slowly.
WuD2, WuE2:						
Westmoreland	Severe: slope.	Severe: piping.	No water	Deep to water	Slope	Slope.
Guernsey	Severe: slope, slippage.	Severe: hard to pack.	Severe: no water.	Percs slowly, slope, frost action.	Slope, erodes easily, slippage.	Slope, erodes easily, percs slowly.
WvD:						
Westmoreland	Severe: slope.	Severe: piping.	No water	Deep to water	Slope	Slope.
Urban land.						

TABLE 17.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
ZnB--------------- Zanesville	Moderate: seepage, depth to rock, slope.	Severe: piping.	Severe: no water.	Percs slowly, frost action, slope.	Erodes easily, wetness.	Erodes easily, rooting depth.
ZnC2-------------- Zanesville	Severe: slope.	Severe: piping.	Severe: no water.	Percs slowly, frost action, slope.	Slope, erodes easily, wetness.	Slope, erodes easily, rooting depth.

TABLE 18.--ENGINEERING INDEX PROPERTIES

(The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated)

Soil name and map symbol	Depth	USDA texture	Classification		Fragments >3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
AaB, AaC2, AaD2 Aaron	0-7	Silt loam	CL-ML, CL	A-4, A-6	0	95-100	95-100	85-100	70-90	20-35	5-15
	7-46	Silty clay loam, silty clay, clay.	CL, CH	A-7	0-5	90-100	90-100	85-100	80-100	45-70	22-43
	46-48	Weathered bedrock	---	---	---	---	---	---	---	---	---
AcB:											
Aaron	0-7	Silt loam	CL-ML, CL	A-4, A-6	0	95-100	95-100	85-100	70-90	20-35	5-15
	7-44	Silty clay loam, silty clay, clay.	CL, CH	A-7	0-5	90-100	90-100	85-100	80-100	45-70	22-43
	44-46	Weathered bedrock	---	---	---	---	---	---	---	---	---
Upshur	0-7	Silty clay loam	CL, ML	A-6, A-7	0	95-100	95-100	90-100	80-95	35-50	11-25
	7-50	Silty clay, clay	MH, CH, CL	A-7	0	95-100	95-100	90-100	85-100	45-70	20-40
	50-72	Silty clay loam, shaly silty clay, clay.	CL, ML, MH, CH	A-6, A-7	0	80-100	65-100	60-100	55-95	35-55	11-25
AfB, AfC2 Alford	0-10	Silt loam	CL, CL-ML	A-4, A-6	0	100	100	90-100	70-100	20-30	5-15
	10-50	Silty clay loam, silt loam.	CL	A-6	0	100	100	90-100	80-100	30-40	10-20
	50-80	Silt loam, silt	ML, CL-ML, CL	A-4	0	100	100	90-100	70-100	<25	NP-10
BeB, BeD2, BeE Berks	0-8	Channery silt loam.	GM, ML, GC, SC	A-2, A-4	0-20	50-80	45-70	40-60	30-55	25-36	5-10
	8-28	Channery loam, very channery silt loam, channery silt loam.	GM, GC, SM, SC	A-1, A-2, A-4	0-30	40-80	35-70	25-60	20-45	25-36	5-10
	28-35	Channery loam, very channery silt loam, channery silt loam.	GM, SM	A-1, A-2	0-40	35-65	25-55	20-40	15-35	24-38	2-10
	35-49	Weathered bedrock	---	---	---	---	---	---	---	---	---
BkF:											
Berks	0-10	Channery loam	GM, ML, GC, SC	A-2, A-4	0-20	50-80	45-70	40-60	30-55	25-36	5-10
	10-22	Channery loam, very channery loam, channery silt loam.	GM, SM	A-1, A-2	0-40	35-65	25-55	20-40	15-35	24-38	2-10
	22-24	Weathered bedrock	---	---	---	---	---	---	---	---	---
Westmoreland	0-4	Silt loam	ML, CL	A-4, A-6	0	85-100	80-100	75-95	60-95	<35	NP-10
	4-44	Silty clay loam, channery loam, shaly silt loam.	CL, ML, GM, GC	A-4, A-6, A-7	0-15	65-100	55-95	50-90	45-85	22-45	2-20
	44-46	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

TABLE 18.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments >3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
BoB, BoD Bethesda	0-1	Shaly silt loam	ML, GM, GM-GC, CL-ML	A-4, A-6	0-15	65-90	55-80	50-80	35-75	25-40	4-14
	1-60	Very shaly silty clay loam, very shaly silt loam.	GM, GC, ML, CL	A-4, A-6, A-7, A-2	10-30	40-80	25-65	20-65	18-60	24-50	3-23
BpF Bethesda	0-10	Flaggy silt loam	CL, GC, GM, GM-GC	A-6, A-4	15-35	65-90	55-80	50-80	35-75	25-40	4-14
	10-60	Very channery silty clay loam, channery silty clay loam.	GM, GC, ML, CL	A-4, A-6, A-7, A-2	10-30	40-80	25-65	20-65	18-60	24-50	3-23
BsC2, BsE Brookside	0-10	Silty clay loam	CL	A-6, A-7	0-5	90-100	80-100	75-100	70-95	30-50	10-28
	10-63	Silty clay, gravelly silty clay loam, channery silty clay loam.	CH, CL	A-7, A-6	0-15	80-95	65-90	60-85	55-85	35-70	15-40
	63-70	Channery silty clay loam, clay, silty clay.	CH, CL	A-6, A-7	5-25	70-90	60-75	55-75	50-70	35-65	22-44
Cb Chagrin	0-12	Loam	ML, CL, CL-ML	A-4	0	95-100	85-100	80-100	70-90	20-35	2-10
	12-43	Silt loam, loam, sandy loam.	ML, SM	A-4, A-2, A-6	0	90-100	75-100	55-90	30-80	20-40	NP-14
	43-83	Stratified silt loam to gravelly fine sand.	ML, SM, SP-SM	A-4, A-2	0	75-100	65-100	40-85	10-80	20-40	NP-10
CcA, CcB Chavies	0-12	Loam	SM, ML, CL-ML, SM-SC	A-4	0	85-100	75-100	40-90	40-75	<25	NP-5
	12-42	Fine sandy loam, silt loam, loam.	SM, ML	A-4	0	85-100	75-100	65-100	45-85	<35	NP-8
	42-80	Fine sandy loam, gravelly fine sandy loam, loam, gravelly loamy sand.	SM, ML, CL-ML, SM-SC	A-4, A-2, A-1-b	0-5	70-100	60-95	40-85	20-75	<25	NP-5
CeA, CeB Chili	0-12	Loam	ML, CL-ML	A-4	0	85-100	75-100	65-85	55-75	25-35	4-10
	12-48	Loam, gravelly clay loam, gravelly sandy loam.	ML, SM, GM, CL	A-4, A-2, A-6, A-1-b	0	65-100	50-80	35-70	20-65	<30	NP-12
	48-70	Stratified gravelly loamy sand to very gravelly sand.	GW, GM, SP, SM	A-1	5-10	30-70	25-65	10-45	2-20	---	NP

TABLE 18.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification Unified	Classification AASHTO	Fragments >3 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
ChA, ChB, ChC Chili	0-9	Gravelly loam	SM, ML, GM	A-4, A-2, A-1-b	0	65-90	55-75	35-70	15-55	<30	NP-7
	9-43	Gravelly loam, gravelly clay loam, gravelly sandy loam.	ML, SM, GM, CL	A-4, A-2, A-6, A-1-b	0	65-100	50-80	35-70	20-65	<30	NP-12
	43-60	Stratified gravelly loamy sand to very gravelly sand.	GW, GM, SP, SM	A-1	5-10	30-70	25-65	10-45	2-20	---	NP
CkA Cidermill	0-8	Silt loam	CL, CL-ML	A-4, A-6	0	100	100	90-100	70-90	20-35	5-15
	8-36	Silt loam, silty clay loam.	CL, CL-ML	A-6, A-4	0	100	100	90-100	70-90	20-35	5-15
	36-56	Loam, gravelly clay loam, fine sandy loam.	ML, SM, GM, CL	A-4, A-2, A-6	0-5	65-100	40-85	35-75	30-70	<30	NP-15
	56-80	Stratified sandy loam to very gravelly coarse sand.	SM, GM, GW, SP	A-1	0-15	30-70	25-65	10-45	2-25	---	NP
CnB Cincinnati	0-8	Silt loam	ML, CL	A-4, A-6	0	100	95-100	90-100	80-100	25-40	3-16
	8-28	Silty clay loam, loam, silt loam.	CL	A-6, A-4	0	95-100	90-100	85-100	70-100	25-40	8-15
	28-50	Clay loam, loam, silty clay loam.	CL, CL-ML	A-6, A-4	0	85-100	75-95	70-90	55-80	25-40	5-20
	50-69	Clay loam, loam, silty clay loam.	CL, ML, CL-ML	A-6, A-4	0	85-100	75-95	70-90	55-80	25-40	5-20
	69-80	Weathered bedrock	---	---	---	---	---	---	---	---	---
CnC2 Cincinnati	0-8	Silt loam	ML, CL	A-4, A-6	0	100	95-100	90-100	80-100	25-40	3-16
	8-24	Silty clay loam, loam, silt loam.	CL	A-6, A-4	0	95-100	90-100	85-100	70-100	25-40	8-15
	24-50	Clay loam, loam, silty clay loam.	CL, CL-ML	A-6, A-4	0	85-100	75-95	70-90	55-80	25-40	5-20
	50-69	Clay loam, loam, silty clay loam.	CL, ML, CL-ML	A-6, A-4	0	85-100	75-95	70-90	55-80	25-40	5-20
	69-80	Weathered bedrock	---	---	---	---	---	---	---	---	---
CpC2 Clarksburg	0-9	Silt loam	CL	A-4, A-6	0-5	90-100	85-100	80-95	75-90	25-35	2-11
	9-25	Silty clay loam, channery clay loam, silt loam.	ML, CL, CL-ML	A-4, A-6, A-7	0-10	80-100	65-100	60-95	55-85	25-45	6-20
	25-44	Clay loam, channery clay loam, gravelly silt loam.	CL-ML, CL, SM-SC, SC	A-4, A-6, A-7	0-15	75-100	55-100	50-95	45-90	20-45	4-20
	44-80	Clay loam, channery clay loam, silty clay loam.	CL, CH, SM-SC, GC	A-4, A-6, A-7, A-2	0-20	50-100	20-100	15-95	15-90	20-52	4-25
CrC:											
Claysville	0-8	Silty clay loam	CL	A-6, A-7	0	90-100	80-100	75-100	70-95	25-50	15-30
	8-54	Silty clay loam, silty clay, shaly silty clay.	CH, CL, MH, ML	A-7	0-5	75-100	70-100	65-100	60-95	45-70	20-35
	54-84	Silty clay, shaly silty clay loam, silty clay loam.	CL, CH	A-6, A-7	0-5	70-100	60-95	55-95	50-90	35-55	15-30

TABLE 18.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments >3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
CrC: Guernsey	0-7	Silty clay loam	CL	A-4, A-6, A-7	0-2	90-100	80-100	75-100	70-95	25-45	8-22
	7-39	Silty clay, clay, silty clay loam.	CH, CL, ML, MH	A-7	0-10	75-100	65-100	60-100	55-100	45-65	15-35
	39-60	Clay, silty clay, shaly silty clay loam.	CH, MH, ML, CL	A-7	0-20	70-100	60-90	55-90	55-90	40-70	15-40
CsC2, CsD Coshocton	0-8	Silt loam	ML, CL-ML	A-4, A-6	0-5	85-100	80-100	70-95	60-90	25-40	4-12
	8-20	Silt loam, silty clay loam, clay loam.	CL, CL-ML	A-6, A-4	0-5	85-100	80-100	70-95	60-90	25-40	6-18
	20-40	Silty clay loam, silty clay.	CL, CH	A-7, A-6	0-10	70-100	60-95	55-90	50-85	35-55	20-35
	40-65	Shaly silty clay loam, silty clay, silty clay loam.	CL, CH, GC, SC	A-7, A-6, A-2	0-20	40-100	30-95	30-85	30-80	30-55	16-35
	65-80	Weathered bedrock	---	---	---	---	---	---	---	---	---
CtE: Coshocton	0-8	Silt loam	ML, CL-ML	A-4, A-6	0-5	85-100	80-100	70-95	60-90	25-40	4-12
	8-20	Silt loam, silty clay loam, clay loam.	CL, CL-ML	A-6, A-4	0-5	85-100	80-100	70-95	60-90	25-40	6-18
	20-40	Silty clay loam, silty clay.	CL, CH	A-7, A-6	0-10	70-100	60-95	55-90	50-85	35-55	20-35
	40-60	Shaly silty clay loam, silty clay, very channery loam.	CL, CH, GC, SC	A-7, A-6, A-2	0-20	40-100	30-95	30-85	30-80	30-55	16-35
	60-75	Weathered bedrock	---	---	---	---	---	---	---	---	---
Westmoreland	0-5	Silt loam	ML, CL	A-4, A-6	0	85-100	80-100	75-95	60-95	<35	NP-10
	5-37	Silty clay loam, shaly silty clay loam, shaly silt loam.	CL, ML, GM, GC	A-4, A-6, A-7	0-15	65-100	55-95	50-90	45-85	22-45	2-20
	37-65	Very channery loam, very channery silt loam, very shaly silty clay loam.	GM, GC, SM, SC	A-2, A-1, A-4, A-6	0-20	25-95	20-95	15-90	15-80	20-40	2-20
	65-70	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Ds. Dumps and Pits											
FaB, FaD, FaE Fairpoint	0-7	Silty clay loam	CL	A-6, A-7	0-5	90-100	80-100	70-95	60-95	35-50	12-24
	7-60	Gravelly clay loam, very shaly silty clay loam, shaly silty clay loam.	GC, CL, CL-ML, SC	A-4, A-6, A-7, A-2	15-30	55-75	25-65	20-65	15-60	25-50	4-24

TABLE 18.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments >3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
FbF-------------- Fairpoint	0-4	Channery silty clay loam.	CL, SC, GC	A-6, A-7	5-20	55-90	45-80	40-80	35-80	35-50	12-24
	4-60	Shaly clay loam, very channery silty clay loam, extremely channery silty clay loam.	GC, CL, CL-ML, SC	A-4, A-6, A-7, A-2	15-30	55-75	25-65	20-65	15-60	25-50	4-24
FcA-------------- Fitchville	0-10	Silt loam--------	CL-ML, CL	A-4, A-6	0	100	100	95-100	85-95	24-40	4-16
	10-58	Silt loam, silty clay loam.	CL, ML	A-6, A-4, A-7	0	100	100	90-100	80-100	28-50	5-23
	58-70	Silt loam, loam, silty clay loam.	ML, CL, CL-ML	A-4, A-6	0	95-100	90-100	80-100	60-100	20-40	3-18
FcB-------------- Fitchville	0-14	Silt loam--------	CL-ML, CL	A-4, A-6	0	100	100	95-100	85-95	24-40	4-16
	14-58	Silt loam, silty clay loam.	CL, ML	A-6, A-4, A-7	0	100	100	90-100	80-100	28-50	5-23
	58-70	Silt loam, loam, silty clay loam.	ML, CL, CL-ML	A-4, A-6	0	95-100	90-100	80-100	60-100	20-40	3-18
FkB: Frankstown Variant--------	0-9	Silt loam--------	ML, CL-ML, CL	A-4	0-10	90-100	80-95	75-95	60-80	20-30	3-10
	9-16	Cherty silt loam, silty clay loam.	CL-ML, CL	A-4, A-6	0-10	90-100	80-95	75-95	60-90	20-35	5-15
	16-22	Cherty silt loam, very cherty silty clay loam.	CL, GM-GC, GC, CL-ML	A-2, A-4, A-6	5-20	50-90	35-70	35-70	25-60	25-40	5-15
	22-25	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Mertz-----------	0-6	Very cherty silt loam.	ML, GM	A-4	5-10	70-95	55-85	45-85	40-75	---	NP
	6-48	Cherty clay loam, very cherty silty clay loam, cherty silt loam.	ML, CL, GM, GC	A-6, A-7, A-4	5-20	55-95	45-85	45-85	40-75	30-45	7-20
	48-60	Cherty clay loam, very cherty loam, very channery silty clay loam.	CL, GC, SC	A-6, A-7, A-2	5-50	55-80	30-75	30-70	25-55	30-45	10-20
GdB, GdC2-------- Gilpin	0-9	Silt loam--------	CL, CL-ML	A-4, A-6	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	9-30	Channery clay loam, silt loam, clay loam.	GC, SC, CL, CL-ML	A-2, A-4, A-6	0-30	50-95	45-90	35-85	30-80	20-40	4-15
	30-40	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
GeD2, GeE2: Gilpin----------	0-4	Silt loam--------	CL, CL-ML	A-4, A-6	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	4-28	Channery silt loam, silt loam, silty clay loam.	GC, SC, CL, CL-ML	A-2, A-4, A-6	0-30	50-95	45-90	35-85	30-80	20-40	4-15
	28-30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

TABLE 18.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments >3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
GeD2, GeE2:											
Upshur----------	0-5	Silty clay loam	CL, ML	A-6, A-7	0	95-100	95-100	90-100	80-95	35-50	11-25
	5-45	Silty clay, shaly silty clay, channery silty clay.	MH, CH, CL	A-7	0	95-100	95-100	90-100	85-100	45-70	20-40
	45-62	Shaly silty clay loam, silty clay, very channery silty clay.	CL, ML, MH, CH	A-6, A-7	0	80-100	65-100	60-100	55-95	35-55	11-25
	62-64	Weathered bedrock	---	---	---	---	---	---	---	---	---
GfA, GfB--------- Glenford	0-10	Silt loam--------	CL-ML, CL, ML	A-4, A-6	0	100	100	95-100	80-100	25-40	4-14
	10-34	Silty clay loam, silt loam.	CL, CL-ML, ML	A-6, A-7, A-4	0	100	100	95-100	80-100	25-45	5-18
	34-50	Silt loam, silty clay loam.	CL, ML, CL-ML	A-6, A-4	0	100	95-100	90-100	75-100	20-40	3-18
	50-60	Stratified silty clay loam to fine sandy loam.	ML, CL, CL-ML	A-4, A-6	0	95-100	90-100	85-100	70-100	20-40	3-15
GfC2------------- Glenford	0-6	Silt loam--------	CL-ML, CL, ML	A-4, A-6	0	100	100	95-100	80-100	25-40	4-14
	6-26	Silty clay loam, silt loam.	CL, CL-ML, ML	A-6, A-7, A-4	0	100	100	95-100	80-100	25-45	5-18
	26-40	Silt loam, silty clay loam.	CL, ML, CL-ML	A-6, A-4	0	100	95-100	90-100	75-100	20-40	3-18
	40-60	Stratified silty clay loam to fine sandy loam.	ML, CL, CL-ML	A-4, A-6	0	95-100	90-100	85-100	70-100	20-40	3-15
GtC2, GtD2:											
Guernsey--------	0-7	Silty clay loam	CL	A-4, A-6, A-7	0-2	90-100	80-100	75-100	70-95	25-45	8-22
	7-39	Silty clay, clay, channery silty clay.	CH, CL, ML, MH	A-7	0-10	75-100	65-100	60-100	55-100	45-65	15-35
	39-62	Channery silty clay, silty clay, shaly silty clay loam.	CH, MH, ML, CL	A-7	0-20	70-100	60-90	55-90	55-90	40-70	15-40
	62-64	Weathered bedrock	---	---	---	---	---	---	---	---	---
Upshur----------	0-4	Silty clay loam	CL, ML	A-6, A-7	0	95-100	95-100	90-100	80-95	35-50	11-25
	4-40	Silty clay, clay, silty clay loam.	MH, CH, CL	A-7	0	95-100	95-100	90-100	85-100	45-70	20-40
	40-74	Silty clay loam, silty clay, clay.	CL, ML, MH, CH	A-6, A-7	0	80-100	65-100	60-100	55-95	35-55	11-25
HaC2, HaD2------- Homewood	0-7	Silt loam--------	ML	A-4	0	95-100	90-100	85-100	75-100	25-35	NP-10
	7-28	Loam, silty clay loam, clay loam.	ML, CL	A-4, A-6	0-2	90-100	85-100	75-100	55-80	30-40	5-15
	28-46	Loam, clay loam, gravelly clay loam.	CL-ML, CL, ML, SM-SC	A-4, A-6	0-5	70-100	60-95	55-90	45-80	25-40	5-15
	46-80	Loam, clay loam, gravelly silt loam.	SC, CL, CL-ML, SM-SC	A-4, A-6	0-10	70-100	55-95	50-90	40-80	20-35	5-15

TABLE 18.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments >3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
JtA Jimtown	0-8	Loam	ML, CL-ML, CL	A-4	0	95-100	75-100	60-95	50-80	20-30	NP-8
	8-40	Loam, gravelly loam, gravelly clay loam.	CL-ML, CL, SM-SC, SC	A-4, A-6, A-2	0-2	75-100	55-100	45-95	30-75	25-40	4-15
	40-48	Sandy loam, gravelly loam, very gravelly loamy sand.	SM, SC, GM, GC	A-1, A-4, A-2	0-5	50-90	40-75	30-70	20-55	<30	NP-8
	48-80	Stratified gravelly loam to very gravelly sand.	SM, GM	A-1, A-4, A-2	0-5	45-90	30-80	20-75	15-50	<30	NP-7
KeB, KeC2 Keene	0-8	Silt loam	CL, CL-ML, ML	A-4, A-6	0	95-100	90-100	85-100	70-95	25-36	4-12
	8-30	Silt loam, silty clay loam.	CL, CL-ML, ML	A-6, A-4	0	95-100	90-100	85-100	75-100	25-40	6-18
	30-38	Silty clay loam, silty clay.	CL, CH	A-6, A-7	0-5	95-100	75-100	70-95	65-90	30-55	10-28
	38-74	Channery silty clay loam, shaly silty clay, clay.	CL, CH	A-6, A-7	5-20	65-100	55-100	55-90	50-85	30-55	10-28
	74-80	Weathered bedrock	---	---	---	---	---	---	---	---	---
Km Killbuck	0-10	Silt loam	ML, CL-ML	A-4	0	100	95-100	90-100	65-90	25-35	4-10
	10-28	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	100	95-100	90-100	80-95	25-40	4-15
	28-35	Silty clay loam, silty clay, shaly silty clay loam.	CL	A-6, A-7	0	90-100	85-100	80-100	70-95	30-50	12-30
	35-80	Silty clay loam, silt loam, clay loam.	CL	A-6, A-7	0	90-100	85-100	80-100	70-95	25-45	11-28
LaC Lakin	0-9	Loamy fine sand	SM, SM-SC	A-2	0	95-100	95-100	95-100	10-35	<30	NP-7
	9-55	Loamy sand, fine sandy loam, loamy fine sand.	SM, SM-SC, SP-SM	A-2, A-3	0	95-100	95-100	90-100	5-35	<30	NP-7
	55-87	Fine sand, sandy loam, loamy fine sand.	SM, SM-SC, GM, SP-SM	A-1, A-2, A-3	0	40-100	35-100	20-80	5-25	<30	NP-7
LcD:											
Lakin	0-10	Loamy fine sand	SM, SM-SC	A-2	0	95-100	95-100	95-100	10-35	<30	NP-7
	10-47	Loamy sand, fine sand, loamy fine sand.	SM, SM-SC, SP-SM	A-2, A-3	0	95-100	95-100	90-100	5-35	<30	NP-7
	47-77	Sand, sandy loam, gravelly sand.	SM, SM-SC, GM, SP-SM	A-1, A-2, A-3	0	40-100	35-100	20-80	5-25	<30	NP-7
Alford	0-4	Silt loam	CL, CL-ML	A-4, A-6	0	100	100	90-100	70-100	20-30	5-15
	4-45	Silty clay loam, silt loam.	CL	A-6	0	100	100	90-100	80-100	30-40	10-20
	45-60	Silt loam, silt	ML, CL-ML, CL	A-4	0	100	100	90-100	70-100	<25	NP-10

TABLE 18.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments >3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Lk--------------- Lindside	0-9	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0	100	95-100	80-100	55-90	20-35	2-15
	9-40	Silty clay loam, silt loam, very fine sandy loam.	CL, ML, CL-ML	A-4, A-6	0	100	95-100	90-100	70-95	25-40	4-18
	40-60	Stratified silty clay loam to gravelly sandy loam.	CL, ML, SM, SC	A-2, A-4, A-6	0	60-100	55-100	45-100	30-95	20-40	4-18
Lm--------------- Lobdell	0-6	Loam-------------	ML, CL-ML, CL	A-4	0	95-100	90-100	80-100	65-90	20-30	NP-8
	6-14	Loam, silt loam	ML	A-4	0	90-100	80-100	70-95	55-85	20-35	NP-10
	14-28	Loam, silt loam, channery silt loam.	ML, SM, CL-ML, CL	A-4	0-5	75-100	65-95	60-90	45-80	15-35	NP-10
	28-63	Stratified silt loam to channery sandy loam.	SM, SC, SM-SC, ML	A-2, A-4, A-1	5-15	65-90	55-85	40-70	20-65	<30	NP-8
Lo--------------- Lorain	0-7	Silty clay-------	MH	A-7	0	100	100	90-100	80-100	60-80	15-30
	7-48	Silty clay, silty clay loam, clay.	CH, CL, MH, ML	A-6, A-7	0	100	100	90-100	80-100	35-65	15-45
	48-60	Clay, silty clay, silty clay loam.	CH, CL, MH	A-7	0	100	100	90-100	80-100	40-75	20-45
LpC2, LpD2------- Lowell	0-8	Silt loam--------	CL, CL-ML	A-4	0	100	95-100	85-100	70-90	22-32	4-10
	8-18	Silty clay loam	CL	A-6, A-7	0-2	95-100	95-100	90-100	80-95	34-42	15-22
	18-57	Silty clay, silty clay loam, clay.	CH, CL	A-7, A-6	0-5	95-100	90-100	80-100	75-95	35-65	15-45
	57-70	Channery silty clay loam, shaly silty clay, silty clay loam.	GC, CL, SC	A-6, A-7	5-20	65-90	55-80	50-80	45-75	30-45	15-30
	70-72	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
LrE2, LrF: Lowell----------	0-7	Silt loam--------	ML, CL, CL-ML	A-4	0	100	95-100	90-100	85-100	22-32	3-10
	7-48	Silty clay, channery silty clay, silty clay loam.	CL, CH, MH	A-7, A-6	0	100	95-100	90-100	85-100	35-65	15-32
	48-60	Clay, channery silty clay loam.	CH, MH, CL	A-7	0-20	95-100	90-100	85-100	75-100	45-75	20-40
Gilpin----------	0-2	Channery silt loam.	GC, SC, CL, CL-ML	A-2, A-4, A-6	0-30	50-90	45-85	35-75	30-70	20-40	4-15
	2-12	Channery silt loam, shaly silt loam, silty clay loam.	GC, SC, CL, CL-ML	A-2, A-4, A-6	0-30	50-95	45-90	35-85	30-80	20-40	4-15
	12-22	Channery loam, very channery silt loam, very shaly silty clay loam.	GC, GM-GC	A-1, A-2, A-4, A-6	0-35	25-55	20-50	15-45	15-40	20-40	4-15
	22-24	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

TABLE 18.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments >3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Lu--------------- Luray	0-16	Silty clay loam	CL, CH, MH, ML	A-6, A-7	0	100	100	95-100	85-95	35-55	10-25
	16-55	Silty clay loam, silt loam.	CL, CH, MH, ML	A-6, A-7	0	100	100	95-100	80-95	35-60	15-30
	55-60	Stratified fine sandy loam to silty clay loam.	CL, ML, CL-ML	A-6, A-4, A-7	0	100	95-100	80-100	55-100	25-50	5-20
MaB-------------- Markland	0-7	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	90-100	70-90	25-35	5-15
	7-28	Silty clay, clay, silty clay loam.	CL, CH	A-7	0	100	100	95-100	90-95	45-60	19-32
	28-80	Stratified clay to silty clay loam.	CL, CH, ML, MH	A-7	0	100	100	90-100	75-95	40-55	15-25
MbC2------------- Markland	0-6	Silty clay loam	CL	A-6, A-7	0	100	100	95-100	85-95	30-45	10-20
	6-30	Silty clay, clay, silty clay loam.	CL, CH	A-7	0	100	100	95-100	90-95	45-60	19-32
	30-80	Stratified clay to silty clay loam.	CL, CH, ML, MH	A-7	0	100	100	90-100	75-95	40-55	15-25
McD2: Markland--------	0-7	Silty clay loam	CL	A-6, A-7	0	100	100	95-100	85-95	30-45	10-20
	7-31	Silty clay, clay, silty clay loam.	CL, CH	A-7	0	100	100	95-100	90-95	45-60	19-32
	31-80	Stratified clay to silty clay loam.	CL, CH, ML, MH	A-7	0	100	100	90-100	75-95	40-55	15-25
McD2: Glenford--------	0-8	Silt loam--------	CL-ML, CL, ML	A-4, A-6	0	100	100	95-100	80-100	25-40	4-14
	8-30	Silty clay loam, silt loam.	CL, CL-ML, ML	A-6, A-7, A-4	0	100	100	95-100	80-100	25-45	5-18
	30-60	Stratified silty clay loam to fine sandy loam.	ML, CL, CL-ML	A-4, A-6	0	95-100	90-100	85-100	70-100	20-40	3-15
MdA-------------- McGary	0-6	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	90-100	70-95	25-40	5-15
	6-40	Silty clay, silty clay loam.	CL, CH	A-7	0	100	100	95-100	90-100	45-60	25-35
	40-60	Stratified silty clay loam to clay.	CL, CH	A-6, A-7	0	95-100	95-100	95-100	85-100	35-55	20-35
Me--------------- Melvin	0-3	Silt loam--------	CL, CL-ML, ML	A-4	0	95-100	90-100	80-100	80-95	25-35	4-10
	3-44	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	95-100	90-100	80-100	80-98	25-40	5-20
	44-60	Silt loam, silty clay loam, loam.	CL, CL-ML	A-4, A-6	0	85-100	80-100	70-100	60-98	25-40	5-20

TABLE 18.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments >3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
MkD-------------- Mertz	0-7	Very cherty silt loam.	ML, GM	A-4	5-15	55-70	35-55	30-55	20-50	---	NP
	7-30	Cherty clay loam, very cherty silty clay loam, cherty silt loam.	ML, CL, GM, GC	A-6, A-7, A-4	5-20	55-95	45-85	45-85	40-75	30-45	7-20
	30-60	Channery clay loam, very channery loam, very channery silty clay loam.	CL, GC, SC	A-6, A-7, A-2	5-50	55-80	30-75	30-70	25-55	30-45	10-20
MrB, MrD, MrF---- Morristown	0-5	Shaly silty clay loam.	CL, GC, SC	A-7, A-6	5-15	70-95	50-80	50-75	40-70	35-50	12-24
	5-60	Very channery silty clay loam, very cobbly clay loam.	GC, CL, CL-ML, GM-GC	A-7, A-6, A-4, A-2	10-25	35-75	25-65	20-65	15-60	25-50	4-24
MsB, MsC, MsD, MsE------------- Morristown	0-8	Silty clay loam	CL	A-7, A-6	0-5	90-100	80-100	70-95	60-95	35-50	12-24
	8-60	Very channery silty clay loam, very channery clay loam.	GM-GC, GC, CL, CL-ML	A-7, A-6, A-4, A-2	10-25	35-75	25-65	20-65	15-60	25-50	4-24
Ne--------------- Newark	0-11	Silt loam--------	ML, CL, CL-ML	A-4	0	95-100	90-100	80-100	55-95	<32	NP-10
	11-32	Silt loam, silty clay loam.	ML, CL, CL-ML	A-4, A-6, A-7	0	95-100	90-100	85-100	70-100	22-42	3-20
	32-60	Silt loam, silty clay loam.	ML, CL, CL-ML	A-4, A-6, A-7	0-3	75-100	70-100	65-100	55-95	22-42	3-20
No--------------- Nolin	0-7	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	95-100	90-100	80-100	25-40	5-18
	7-60	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6, A-7	0	100	95-100	85-100	75-100	25-46	5-23
OmB, OmC--------- Omulga	0-8	Silt loam--------	ML, CL-ML, CL	A-4, A-6	0	95-100	90-100	85-100	65-90	25-35	5-15
	8-24	Silty clay loam, silt loam.	CL, CL-ML, ML	A-4, A-6, A-7	0	95-100	90-100	85-100	65-100	25-45	5-20
	24-44	Silty clay loam, silt loam, clay loam.	CL, CL-ML, ML	A-6, A-4	0	85-100	80-100	75-95	60-90	20-40	5-20
	44-58	Silty clay loam, silt loam.	CL, CL-ML, ML	A-6, A-7, A-4	0	85-100	80-100	75-95	70-90	20-45	5-20
	58-66	Stratified sandy loam to clay.	CL	A-6, A-7	0	80-100	75-100	65-95	50-90	30-50	15-30
RaB-------------- Rawson	0-10	Silt loam--------	CL-ML, CL	A-4, A-6	0	90-100	80-100	65-100	50-100	25-40	4-16
	10-38	Loam, sandy loam, silt loam.	SC, CL, GC	A-4, A-6, A-2-4, A-2-6	0	65-100	55-95	45-90	25-75	20-40	7-20
	38-65	Clay, silty clay, silty clay loam.	CH, CL	A-7, A-6	0	90-100	85-100	85-100	75-95	35-65	15-40

TABLE 18.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments >3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
RfC--------------- Rigley	0-10	Loam-------------	SM, ML, SM-SC, CL-ML	A-2, A-4	0-10	80-95	75-90	55-80	25-65	<30	NP-7
	10-40	Gravelly sandy loam, loam, sandy loam.	SM, ML, GM, GM-GC	A-2, A-4, A-1	0-10	65-95	60-90	40-75	20-60	<30	NP-7
	40-80	Sandy loam, gravelly loam, loamy sand.	GM, GC, SM, SC	A-2, A-1, A-4, A-6	0-20	55-80	45-70	30-60	15-50	<35	NP-15
RgD--------------- Rigley	0-6	Channery loam----	SM, GM, ML, SM-SC	A-2, A-4	0-10	60-85	60-80	50-70	25-65	<30	NP-7
	6-32	Channery sandy loam, channery loam, sandy loam.	SM, ML, GM, GM-GC	A-2, A-4, A-1	0-10	65-95	60-90	40-75	20-60	<30	NP-7
	32-60	Gravelly sandy loam, gravelly loam, channery loamy sand.	GM, GC, SM, SC	A-2, A-1, A-4, A-6	0-20	55-80	45-70	30-60	15-50	<35	NP-15
RhE:											
Rigley----------	0-6	Channery loam----	SM, GM, ML, SM-SC	A-2, A-4	0-10	60-85	60-80	50-70	25-65	<30	NP-7
	6-32	Channery sandy loam, channery loam, sandy loam.	SM, ML, GM, GM-GC	A-2, A-4, A-1	0-10	65-95	60-90	40-75	20-60	<30	NP-7
	32-60	Gravelly sandy loam, gravelly loam, channery loamy sand.	GM, GC, SM, SC	A-2, A-1, A-4, A-6	0-20	55-80	45-70	30-60	15-50	<35	NP-15
RhE:											
Coshocton--------	0-6	Silt loam--------	ML, CL-ML	A-4, A-6	0-5	85-100	80-100	70-95	60-90	25-40	4-12
	6-43	Silty clay loam, silty clay.	CL, CH	A-7, A-6	0-10	70-100	60-95	55-90	50-85	35-55	20-35
	43-48	Shaly silty clay loam, silty clay, very channery loam.	CL, CH, GC, SC	A-7, A-6, A-2	0-20	40-100	30-95	30-85	30-80	30-55	16-35
	48-50	Weathered bedrock	---	---	---	---	---	---	---	---	---
RoF--------------- Rodman	0-12	Gravelly sandy loam.	SM-SC, SM, SP-SM	A-1, A-2	0-2	70-85	65-75	35-60	10-30	<25	NP-5
	12-20	Gravelly sandy loam, gravelly loamy sand.	ML, CL, SC, SM	A-4, A-2, A-1	0-2	70-85	60-85	40-75	20-55	<30	NP-10
	20-60	Stratified sand to very gravelly coarse sand.	SP, SP-SM, GP, GP-GM	A-1	1-5	30-70	22-50	7-20	2-10	---	NP
Se---------------- Sebring	0-10	Silt loam--------	ML, CL-ML, CL	A-4	0	100	100	95-100	85-95	20-35	3-10
	10-55	Silty clay loam, silt loam.	ML, CL	A-4, A-6, A-7	0	100	95-100	90-100	80-100	30-50	7-22
	55-60	Stratified sandy loam to silty clay loam.	ML, CL, CL-ML, SC	A-2, A-4, A-6, A-7	0	90-100	85-100	55-100	30-95	20-45	3-20

TABLE 18.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments >3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
St---------------- Stonelick	0-6	Loam--------------	ML, CL, SM, CL-ML	A-4	0	85-100	75-100	60-95	45-90	20-32	2-10
	6-75	Stratified silt loam to loamy sand.	SM, SP-SM	A-2, A-4, A-3, A-1-b	0	85-100	75-100	40-60	5-40	<15	NP
Ta---------------- Tioga	0-8	Fine sandy loam	ML, SM	A-4	0	100	95-100	65-95	40-85	<15	NP-4
	8-34	Silt loam, sandy loam, fine sandy loam.	SM, GM, ML	A-1, A-2, A-4	0	55-100	50-100	35-90	20-80	<15	NP-2
	34-60	Silt loam, gravelly loam, loamy fine sand.	GW-GM, GM, SM, ML	A-1, A-2, A-4, A-3	0-10	35-100	30-100	15-90	5-80	<15	NP-2
Tf---------------- Tioga	0-20	Fine sandy loam	ML, SM	A-4	0	100	95-100	65-95	40-85	<15	NP-4
	20-38	Silt loam, loam, gravelly fine sandy loam.	SM, GM, ML	A-1, A-2, A-4	0	55-100	50-100	35-90	20-80	<15	NP-2
	38-60	Silt loam, gravelly loam, very gravelly loamy sand.	GW-GM, GM, SM, ML	A-1, A-2, A-4, A-3	0-10	35-100	30-100	15-90	5-80	<15	NP-2
Ud, Ug, Uh. Udorthents											
Uk: Udorthents.											
Pits.											
UsB: Urban land.											
Glenford---------	0-9	Silt loam---------	CL-ML, CL, ML	A-4, A-6	0	100	100	95-100	80-100	25-40	4-14
	9-40	Silt loam, silty clay loam.	CL, ML, CL-ML	A-6, A-4	0	100	95-100	90-100	75-100	20-40	3-18
	40-60	Stratified silty clay loam to fine sandy loam.	ML, CL, CL-ML	A-4, A-6	0	95-100	90-100	85-100	70-100	20-40	3-15
UtA: Urban land.											
Nolin------------	0-7	Silt loam---------	CL, CL-ML	A-4, A-6	0	100	95-100	90-100	80-100	25-40	5-18
	7-60	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6, A-7	0	100	95-100	85-100	75-100	25-46	5-23
UvB: Urban land.											

TABLE 18.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments >3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
UvB:											
Watertown	0-10	Sandy loam	SM	A-2, A-1-b, A-4	0	90-100	80-100	45-70	20-45	---	NP
	10-26	Sandy loam, coarse sandy loam, gravelly sandy loam.	SM	A-1, A-2, A-4	0	70-100	50-100	30-65	15-45	---	NP
	26-60	Very gravelly loamy coarse sand, gravelly loamy sand, loamy sand.	SM, GM, GP-GM, SP-SM	A-1, A-2, A-3	0	40-100	30-100	15-70	5-30	---	NP
UwC:											
Urban land.											
Wellston	0-7	Silt loam	ML	A-4	0	95-100	90-100	85-100	70-95	25-35	3-10
	7-30	Silt loam, silty clay loam.	CL, CL-ML	A-6, A-4	0-5	75-100	70-100	60-95	60-90	25-40	5-20
	30-54	Silt loam, loam, gravelly loam.	CL-ML, CL, SC, SM-SC	A-4, A-6	0-10	65-90	65-90	60-90	40-65	20-35	5-15
	54-60	Very channery loam, gravelly sandy loam, channery clay loam.	SM-SC, SC, GM-GC, CL	A-1-b, A-2, A-4, A-6	0-15	60-80	45-75	30-70	15-55	20-35	5-15
WaB, WaC Watertown	0-12	Sandy loam	SM	A-2, A-1-b, A-4	0	90-100	80-100	45-70	20-45	---	NP
	12-25	Sandy loam, coarse sandy loam, gravelly sandy loam.	SM	A-1, A-2, A-4	0	70-100	50-100	30-65	15-45	---	NP
	25-42	Very gravelly loamy coarse sand, gravelly loamy sand, loamy sand.	SM, GM, GP-GM, SP-SM	A-1, A-2, A-3	0	40-100	30-100	15-70	5-30	---	NP
	42-80	Sand, very gravelly coarse sand, gravelly coarse sand.	SM, GM, GP-GM, SP-SM	A-1	0	40-100	20-100	10-50	5-25	---	NP
WhB, WhC2 Wellston	0-7	Silt loam	ML	A-4	0	95-100	90-100	85-100	70-95	25-35	3-10
	7-48	Silt loam, silty clay loam.	CL, CL-ML	A-6, A-4	0-5	75-100	70-100	60-95	60-90	25-40	5-20
	48-50	Weathered bedrock	---	---	---	---	---	---	---	---	---
WmB, WmC2 Westgate	0-7	Silt loam	ML, CL-ML, CL	A-4	0	95-100	90-100	80-100	70-100	22-35	3-10
	7-34	Silt loam, silty clay loam.	CL, ML	A-6, A-7	0	95-100	90-100	85-100	80-100	30-50	10-20
	34-57	Silty clay loam, silty clay, clay.	CH, CL	A-7, A-6	0-5	90-100	80-100	70-100	60-100	35-60	20-35
	57-75	Silty clay loam, silty clay.	CL, CH	A-7, A-6	0-10	80-100	65-100	60-100	55-95	35-55	15-35
	75-80	Weathered bedrock	---	---	---	---	---	---	---	---	---

TABLE 18.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments >3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
WtC2, WtD2 Westmoreland	0-6	Silt loam	ML, CL	A-4, A-6	0	85-100	80-100	75-95	60-95	<35	NP-10
	6-32	Channery silty clay loam, channery loam, silt loam.	CL, ML, GM, GC	A-4, A-6, A-7	0-15	65-100	55-95	50-90	45-85	22-45	2-20
	32-44	Very channery silty clay loam, very channery silt loam, shaly silty clay loam.	GM, GC, SM, SC	A-2, A-1, A-4, A-6	0-20	25-95	20-95	15-90	15-80	20-40	2-20
	44-50	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
WtE Westmoreland	0-9	Silt loam	ML, CL	A-4, A-6	0	85-100	80-100	75-95	60-95	<35	NP-10
	9-45	Silty clay loam, channery silt loam, silt loam.	CL, ML, GM, GC	A-4, A-6, A-7	0-15	65-100	55-95	50-90	45-85	22-45	2-20
	45-60	Very channery loam, very channery silt loam, silty clay loam.	GM, GC, SM, SC	A-2, A-1, A-4, A-6	0-20	25-95	20-95	15-90	15-80	20-40	2-20
	60-70	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
WuC2, WuD2, WuE2: Westmoreland	0-9	Silt loam	ML, CL	A-4, A-6	0	85-100	80-100	75-95	60-95	<35	NP-10
	9-40	Silty clay loam, channery loam, shaly silt loam.	CL, ML, GM, GC	A-4, A-6, A-7	0-15	65-100	55-95	50-90	45-85	22-45	2-20
	40-60	Very channery loam, very channery silt loam, shaly silty clay loam.	GM, GC, SM, SC	A-2, A-1, A-4, A-6	0-20	25-95	20-95	15-90	15-80	20-40	2-20
	60-62	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Guernsey	0-8	Silt loam	ML, CL-ML, CL	A-4, A-6	0-2	90-100	80-100	75-100	70-90	25-40	4-14
	8-52	Silty clay, clay, silty clay loam.	CH, CL, ML, MH	A-7	0-10	75-100	65-100	60-100	55-100	45-65	15-35
	52-55	Clay, silty clay, shaly silty clay loam.	CH, MH, ML, CL	A-7	0-20	70-100	60-90	55-90	55-90	40-70	15-40
	55-57	Weathered bedrock	---	---	---	---	---	---	---	---	---
WvD: Westmoreland	0-9	Silt loam	ML, CL	A-4, A-6	0	85-100	80-100	75-95	60-95	<35	NP-10
	9-40	Silty clay loam, channery silty clay loam, channery silt loam.	CL, ML, GM, GC	A-4, A-6, A-7	0-15	65-100	55-95	50-90	45-85	22-45	2-20
	40-60	Very channery clay loam, very channery silt loam, shaly silty clay loam.	GM, GC, SM, SC	A-2, A-1, A-4, A-6	0-20	25-95	20-95	15-90	15-80	20-40	2-20
	60-65	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Urban land.											

TABLE 18.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments >3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
ZnB, ZnC2-------- Zanesville	0-7	Silt loam--------	CL-ML, CL, ML	A-4, A-6	0	95-100	95-100	90-100	80-100	25-40	4-15
	7-28	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	95-100	95-100	90-100	80-100	25-40	5-20
	28-45	Silt loam, silty clay loam.	ML, CL, CL-ML	A-4, A-6	0-3	90-100	85-100	80-100	60-100	20-40	2-20
	45-80	Sandy clay loam, clay loam, channery loam.	SC, CL, SM, GM	A-6, A-4, A-2, A-1-b	0-10	65-100	50-100	40-100	20-85	20-40	2-20

TABLE 19.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

(The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated)

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
AaB, AaC2, AaD2	0-7	10-27	1.20-1.40	0.6-2.0	0.19-0.23	4.5-7.8	Low	0.37	3	6	1-3
Aaron	7-46	35-60	1.30-1.60	0.06-0.2	0.14-0.18	5.1-7.8	High	0.28			
	46-48	---	---	---	---	---	---	---			
AcB:											
Aaron	0-7	10-27	1.20-1.40	0.6-2.0	0.19-0.23	4.5-7.8	Low	0.37	3	6	1-3
	7-44	35-60	1.30-1.60	0.06-0.2	0.14-0.18	5.1-7.8	High	0.28			
	44-46	---	---	---	---	---	---	---			
Upshur	0-7	27-35	1.20-1.50	0.2-0.6	0.12-0.16	4.5-6.5	Moderate	0.37	3	7	.5-3
	7-50	40-55	1.30-1.60	0.06-0.2	0.10-0.14	4.5-8.4	High	0.32			
	50-72	27-45	1.30-1.60	0.06-0.2	0.08-0.12	5.1-8.4	Moderate	0.32			
AfB, AfC2	0-10	12-26	1.25-1.40	0.6-2.0	0.22-0.24	4.5-7.3	Low	0.37	5-4	5	.5-2
Alford	10-50	22-32	1.35-1.50	0.6-2.0	0.18-0.20	4.5-6.0	Moderate	0.37			
	50-80	8-20	1.30-1.45	0.6-2.0	0.20-0.22	5.1-7.8	Low	0.37			
BeB, BeD2, BeE	0-8	5-23	1.20-1.50	0.6-6.0	0.08-0.12	3.6-6.5	Low	0.17	3	---	.5-3
Berks	8-28	5-32	1.20-1.60	0.6-6.0	0.04-0.10	3.6-6.5	Low	0.17			
	28-35	5-20	1.20-1.60	2.0-6.0	0.04-0.10	3.6-6.5	Low	0.17			
	35-49	---	---	---	---	---	---	---			
BkF:											
Berks	0-10	5-23	1.20-1.50	0.6-6.0	0.08-0.12	3.6-6.5	Low	0.17	3	---	.5-3
	10-22	5-20	1.20-1.60	2.0-6.0	0.04-0.10	3.6-6.5	Low	0.17			
	22-24	---	---	---	---	---	---	---			
Westmoreland	0-4	15-30	1.20-1.40	0.6-2.0	0.16-0.20	4.5-6.0	Low	0.37	3	5	1-4
	4-44	20-35	1.20-1.50	0.6-2.0	0.12-0.18	4.5-6.0	Low	0.28			
	44-46	---	---	---	---	---	---	---			
BoB, BoD	0-1	18-27	1.40-1.55	0.6-2.0	0.10-0.16	3.6-5.5	Low	0.28	5	8	<.5
Bethesda	1-60	18-35	1.60-1.90	0.2-0.6	0.04-0.10	3.6-5.5	Low	0.32			
BpF	0-10	18-27	1.40-1.55	0.6-2.0	0.05-0.10	3.6-5.5	Low	0.28	5	8	<.5
Bethesda	10-60	18-35	1.60-1.90	0.2-0.6	0.04-0.10	3.6-5.5	Low	0.32			
BsC2, BsE	0-10	27-40	1.20-1.50	0.6-2.0	0.18-0.23	4.5-7.8	Moderate	0.37	5	7	1-3
Brookside	10-63	35-55	1.45-1.70	0.2-0.6	0.07-0.14	5.1-7.8	High	0.37			
	63-70	30-60	1.45-1.75	0.2-0.6	0.05-0.12	5.6-8.4	High	0.37			
Cb	0-12	10-27	1.20-1.40	0.6-2.0	0.20-0.24	5.6-7.3	Low	0.32	5	5	2-4
Chagrin	12-43	18-30	1.20-1.50	0.6-2.0	0.14-0.20	5.6-7.3	Low	0.32			
	43-83	5-25	1.20-1.40	0.6-2.0	0.08-0.20	5.6-7.3	Low	0.32			
CcA, CcB	0-12	7-18	1.20-1.40	2.0-6.0	0.11-0.18	4.5-7.3	Low	0.24	4	3	.5-4
Chavies	12-42	7-18	1.20-1.40	2.0-6.0	0.11-0.20	4.5-7.3	Low	0.24			
	42-80	7-18	1.30-1.50	2.0-6.0	0.08-0.18	4.5-6.0	Low	0.24			
CeA, CeB	0-12	5-18	1.30-1.50	0.6-2.0	0.14-0.18	4.5-7.3	Low	0.32	4	5	1-3
Chili	12-48	18-27	1.30-1.55	2.0-6.0	0.09-0.16	4.5-6.5	Low	0.32			
	48-70	1-10	1.25-1.50	6.0-20	0.02-0.08	5.1-7.8	Low	0.10			
ChA, ChB, ChC	0-9	5-15	1.30-1.50	0.6-2.0	0.10-0.14	4.5-7.3	Low	0.24	4	8	1-3
Chili	9-43	18-27	1.30-1.55	2.0-6.0	0.09-0.16	4.5-6.5	Low	0.32			
	43-60	1-10	1.25-1.50	6.0-20	0.02-0.08	5.1-7.8	Low	0.10			

TABLE 19.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
CkA Cidermill	0-8	15-25	1.30-1.45	0.6-2.0	0.18-0.22	4.5-7.3	Low	0.37	4	5	1-3
	8-36	18-30	1.40-1.60	0.6-2.0	0.16-0.20	4.5-6.5	Low	0.37			
	36-56	15-30	1.30-1.60	2.0-6.0	0.12-0.18	4.5-6.0	Low	0.24			
	56-80	1-10	1.20-1.50	6.0-20	0.02-0.08	4.5-6.0	Low	0.10			
CnB Cincinnati	0-8	15-25	1.30-1.50	0.6-2.0	0.22-0.24	4.5-7.3	Low	0.43	4	6	1-3
	8-28	22-35	1.45-1.65	0.6-2.0	0.15-0.19	4.5-5.5	Low	0.37			
	28-50	25-35	1.60-1.85	0.06-0.6	0.08-0.12	4.5-6.5	Moderate	0.37			
	50-69	25-40	1.55-1.75	0.06-0.6	0.08-0.12	4.5-6.5	Moderate	0.37			
	69-80	---	---	---	---	---	-------------	----			
CnC2 Cincinnati	0-8	18-27	1.30-1.50	0.6-2.0	0.22-0.24	4.5-7.3	Low	0.43	4	6	.5-2
	8-24	22-35	1.45-1.65	0.6-2.0	0.15-0.19	4.5-5.5	Low	0.37			
	24-50	25-35	1.60-1.85	0.06-0.6	0.08-0.12	4.5-6.5	Moderate	0.37			
	50-69	25-40	1.55-1.75	0.06-0.6	0.08-0.12	4.5-6.5	Moderate	0.37			
	69-80	---	---	---	---	---	-------------	----			
CpC2 Clarksburg	0-9	10-27	1.20-1.40	0.6-2.0	0.14-0.20	5.1-6.5	Low	0.37	3	---	1-3
	9-25	22-35	1.30-1.50	0.6-2.0	0.12-0.18	5.1-6.5	Moderate	0.28			
	25-44	22-35	1.40-1.70	0.06-0.6	0.06-0.12	5.1-6.5	Moderate	0.28			
	44-80	22-40	1.20-1.60	0.06-0.6	0.06-0.16	4.5-6.5	Moderate	0.28			
CrC:											
Claysville	0-8	32-40	1.25-1.50	0.2-0.6	0.18-0.23	6.1-7.3	Moderate	0.28	5	4	3-7
	8-54	35-50	1.40-1.65	0.06-0.2	0.11-0.18	6.1-7.8	High	0.32			
	54-84	32-50	1.40-1.65	0.06-0.2	0.08-0.14	6.6-8.4	High	0.32			
Guernsey	0-7	27-35	1.35-1.55	0.2-0.6	0.17-0.22	4.5-7.3	Moderate	0.43	3-2	7	.5-2
	7-39	35-60	1.40-1.60	0.06-0.6	0.10-0.15	4.5-7.8	High	0.32			
	39-60	35-60	1.40-1.60	0.06-0.6	0.06-0.10	5.1-8.4	High	0.32			
CsC2, CsD Coshocton	0-8	15-23	1.30-1.50	0.6-2.0	0.18-0.23	3.6-7.3	Low	0.37	5-4	5	1-3
	8-20	18-30	1.35-1.55	0.2-2.0	0.14-0.20	3.6-5.5	Moderate	0.37			
	20-40	24-35	1.40-1.65	0.06-0.6	0.10-0.17	3.6-5.5	Moderate	0.37			
	40-65	24-36	1.45-1.70	0.06-0.6	0.08-0.12	4.5-6.0	Moderate	0.28			
	65-80	---	---	---	---	---	-------------	----			
CtE:											
Coshocton	0-8	15-23	1.30-1.50	0.6-2.0	0.18-0.23	3.6-7.3	Low	0.37	5-4	5	1-3
	8-20	18-30	1.35-1.55	0.2-2.0	0.14-0.20	3.6-5.5	Moderate	0.37			
	20-40	24-35	1.40-1.65	0.06-0.6	0.10-0.17	3.6-5.5	Moderate	0.37			
	40-60	24-36	1.45-1.70	0.06-0.6	0.08-0.12	4.5-6.0	Moderate	0.28			
	60-75	---	---	---	---	---	-------------	----			
Westmoreland	0-5	15-30	1.20-1.40	0.6-2.0	0.16-0.20	4.5-6.0	Low	0.37	3	5	1-4
	5-37	20-35	1.20-1.50	0.6-2.0	0.12-0.18	4.5-6.0	Low	0.28			
	37-65	18-35	1.20-1.50	0.6-2.0	0.06-0.10	5.1-6.0	Low	0.17			
	65-70	---	---	---	---	---	-------------	----			
Ds. Dumps and Pits											
FaB, FaD, FaE Fairpoint	0-7	27-40	1.40-1.65	0.2-0.6	0.12-0.18	5.6-7.3	Moderate	0.43	2	7	.5-2
	7-60	18-35	1.60-1.80	0.2-0.6	0.03-0.10	5.6-7.3	Moderate	0.32			
FbF Fairpoint	0-4	27-35	1.45-1.65	0.2-0.6	0.06-0.15	5.6-7.3	Moderate	0.28	5	8	<.5
	4-60	18-35	1.60-1.80	0.2-0.6	0.03-0.10	5.6-7.3	Moderate	0.28			
FcA Fitchville	0-10	16-27	1.30-1.45	0.6-2.0	0.17-0.21	4.5-7.3	Low	0.37	5	6	2-3
	10-58	20-35	1.45-1.70	0.2-0.6	0.15-0.19	4.5-7.3	Moderate	0.37			
	58-70	16-30	1.40-1.65	0.2-2.0	0.14-0.18	5.6-7.8	Low	0.37			

TABLE 19.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
FcB--------------	0-14	16-27	1.30-1.45	0.6-2.0	0.17-0.21	4.5-7.3	Low----------	0.37	5	6	2-3
Fitchville	14-58	20-35	1.45-1.70	0.2-0.6	0.15-0.19	4.5-7.3	Moderate-----	0.37			
	58-70	16-30	1.40-1.65	0.2-2.0	0.14-0.18	5.6-7.8	Low----------	0.37			
FkB:											
Frankstown Variant--------	0-9	10-20	1.30-1.45	0.6-2.0	0.18-0.22	4.5-6.5	Low----------	0.37	4	5	1-3
	9-16	20-30	1.30-1.45	0.6-2.0	0.16-0.20	4.5-6.0	Low----------	0.37			
	16-22	25-35	1.30-1.45	0.6-2.0	0.09-0.18	4.5-6.0	Moderate-----	0.28			
	22-25	---	---	---	---	---	-------------	----			
Mertz-----------	0-6	10-27	1.20-1.40	0.6-2.0	0.14-0.18	5.1-7.3	Low----------	0.28	4	---	1-3
	6-48	15-35	1.40-1.60	0.2-0.6	0.08-0.18	5.1-7.3	Low----------	0.17			
	48-60	15-35	1.40-1.60	0.2-0.6	0.08-0.18	4.5-5.5	Low----------	0.17			
GdB, GdC2--------	0-9	15-27	1.20-1.40	0.6-2.0	0.12-0.18	3.6-5.5	Low----------	0.32	3	---	.5-4
Gilpin	9-30	18-35	1.20-1.50	0.6-2.0	0.12-0.16	3.6-5.5	Low----------	0.24			
	30-40	---	---	---	---	---	-------------	----			
GeD2, GeE2:											
Gilpin----------	0-4	15-27	1.20-1.40	0.6-2.0	0.12-0.18	3.6-5.5	Low----------	0.32	3	---	.5-4
	4-28	18-35	1.20-1.50	0.6-2.0	0.12-0.16	3.6-5.5	Low----------	0.24			
	28-30	---	---	---	---	---	-------------	----			
Upshur----------	0-5	27-35	1.20-1.50	0.2-0.6	0.12-0.16	4.5-6.5	Moderate-----	0.37	3	7	.5-3
	5-45	40-55	1.30-1.60	0.06-0.2	0.10-0.14	4.5-8.4	High---------	0.32			
	45-62	27-45	1.30-1.60	0.06-0.2	0.08-0.12	5.1-8.4	Moderate-----	0.32			
	62-64	---	---	---	---	---	-------------	----			
GfA, GfB---------	0-10	15-27	1.30-1.45	0.6-2.0	0.16-0.20	4.5-7.3	Low----------	0.37	5-4	6	1-3
Glenford	10-34	18-35	1.45-1.65	0.2-2.0	0.14-0.18	4.5-6.0	Moderate-----	0.43			
	34-50	18-35	1.45-1.65	0.2-0.6	0.13-0.17	5.6-7.3	Low----------	0.43			
	50-60	15-38	1.40-1.60	0.2-2.0	0.12-0.17	5.6-7.8	Low----------	0.37			
GfC2-------------	0-6	15-27	1.30-1.45	0.6-2.0	0.16-0.20	4.5-7.3	Low----------	0.37	5-4	6	1-3
Glenford	6-26	18-35	1.45-1.65	0.2-2.0	0.14-0.18	4.5-6.0	Moderate-----	0.43			
	26-40	18-35	1.45-1.65	0.2-0.6	0.13-0.17	5.6-7.3	Low----------	0.43			
	40-60	15-38	1.40-1.60	0.2-2.0	0.12-0.17	5.6-7.8	Low----------	0.37			
GtC2, GtD2:											
Guernsey--------	0-7	27-35	1.35-1.55	0.2-0.6	0.17-0.22	4.5-7.3	Moderate-----	0.43	3-2	7	.5-2
	7-39	35-60	1.40-1.60	0.06-0.6	0.10-0.15	4.5-7.8	High---------	0.32			
	39-62	35-60	1.40-1.60	0.06-0.6	0.06-0.10	5.1-8.4	High---------	0.32			
	62-64	---	---	---	---	---	-------------	----			
Upshur----------	0-4	27-35	1.20-1.50	0.2-0.6	0.12-0.16	4.5-6.5	Moderate-----	0.37	3	7	.5-3
	4-40	40-55	1.30-1.60	0.06-0.2	0.10-0.14	4.5-8.4	High---------	0.32			
	40-74	27-45	1.30-1.60	0.06-0.2	0.08-0.12	5.1-8.4	Moderate-----	0.32			
HaC2, HaD2-------	0-7	13-25	1.30-1.50	0.6-2.0	0.20-0.23	4.5-7.3	Low----------	0.37	4	5	1-3
Homewood	7-28	24-32	1.40-1.70	0.6-2.0	0.15-0.20	4.5-6.0	Moderate-----	0.37			
	28-46	24-32	1.60-1.90	0.06-0.2	0.06-0.10	4.5-5.5	Moderate-----	0.37			
	46-80	16-30	1.55-1.85	0.06-0.2	0.06-0.10	4.5-7.8	Low----------	0.37			
JtA--------------	0-8	10-24	1.30-1.50	0.6-2.0	0.18-0.22	4.5-7.3	Low----------	0.32	4	5	2-3
Jimtown	8-40	18-27	1.25-1.60	0.6-2.0	0.10-0.18	4.5-6.5	Low----------	0.32			
	40-48	8-20	1.25-1.60	0.6-6.0	0.07-0.11	5.1-6.5	Low----------	0.24			
	48-80	4-16	1.25-1.65	2.0-6.0	0.04-0.10	5.1-8.4	Low----------	0.10			

TABLE 19.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	g/cc	In/hr	In/in	pH					Pct
KeB, KeC2	0-8	12-25	1.30-1.45	0.6-2.0	0.21-0.24	4.5-7.3	Low	0.43	4	5	1-3
Keene	8-30	18-33	1.30-1.55	0.2-2.0	0.18-0.22	4.5-6.0	Moderate	0.37			
	30-38	30-45	1.40-1.60	0.06-0.6	0.10-0.15	4.5-5.5	Moderate	0.37			
	38-74	27-53	1.40-1.60	0.06-0.6	0.08-0.13	4.5-6.5	Moderate	0.37			
	74-80	---	---	---	---	---	-------------	----			
Km	0-10	15-25	1.20-1.45	0.6-2.0	0.21-0.24	5.6-7.3	Low	0.37	5	6	2-4
Killbuck	10-28	18-32	1.25-1.55	0.2-2.0	0.17-0.22	5.6-7.3	Low	0.37			
	28-35	25-45	1.30-1.60	0.2-0.6	0.16-0.22	5.6-7.8	Moderate	0.37			
	35-80	22-40	1.35-1.60	0.2-2.0	0.15-0.20	5.6-7.8	Moderate	0.37			
LaC	0-9	2-6	1.20-1.40	6.0-20	0.06-0.10	4.5-6.0	Low	0.17	5	---	1-2
Lakin	9-55	3-8	1.30-1.50	6.0-20	0.04-0.08	4.5-6.0	Low	0.17			
	55-87	1-3	1.30-1.50	6.0-20	0.04-0.08	4.5-6.0	Low	0.17			
LcD:											
Lakin	0-10	2-6	1.20-1.40	6.0-20	0.06-0.10	4.5-6.0	Low	0.17	5	---	1-2
	10-47	3-8	1.30-1.50	6.0-20	0.04-0.08	4.5-6.0	Low	0.17			
	47-77	1-3	1.30-1.50	6.0-20	0.04-0.08	4.5-6.0	Low	0.17			
Alford	0-4	12-26	1.25-1.40	0.6-2.0	0.22-0.24	4.5-7.3	Low	0.37	5-4	5	.5-2
	4-45	22-32	1.35-1.50	0.6-2.0	0.18-0.20	4.5-6.0	Moderate	0.37			
	45-60	8-20	1.30-1.45	0.6-2.0	0.20-0.22	5.1-6.5	Low	0.37			
Lk	0-9	15-27	1.20-1.40	0.6-2.0	0.20-0.26	5.1-7.8	Low	0.32	5	---	2-4
Lindside	9-40	18-35	1.20-1.40	0.2-2.0	0.17-0.22	5.1-7.8	Low	0.37			
	40-60	18-35	1.20-1.40	0.2-6.0	0.12-0.18	5.6-7.8	Low	0.32			
Lm	0-6	15-27	1.20-1.40	0.6-2.0	0.20-0.24	5.1-7.3	Low	0.37	5	5	1-3
Lobdell	6-14	18-30	1.25-1.60	0.6-2.0	0.17-0.22	5.1-7.3	Low	0.37			
	14-28	18-25	1.25-1.60	0.6-2.0	0.15-0.20	5.1-7.3	Low	0.37			
	28-63	15-25	1.20-1.60	0.6-6.0	0.07-0.16	5.6-7.3	Low	0.32			
Lo	0-7	40-60	1.30-1.50	0.06-0.2	0.11-0.13	5.1-7.3	High	0.32	5	4	4-8
Lorain	7-48	40-55	1.35-1.70	0.06-0.2	0.09-0.13	5.1-7.3	High	0.32			
	48-60	30-55	1.45-1.75	0.06-0.2	0.10-0.14	6.6-7.8	High	0.32			
LpC2, LpD2	0-8	18-27	1.20-1.40	0.6-2.0	0.18-0.23	4.5-6.5	Low	0.37	3	6	1-4
Lowell	8-18	27-33	1.20-1.40	0.2-2.0	0.16-0.20	4.5-6.5	High	0.32			
	18-57	40-55	1.30-1.60	0.2-0.6	0.09-0.13	5.1-7.8	High	0.28			
	57-70	27-35	1.50-1.70	0.2-2.0	0.05-0.14	5.6-7.8	Moderate	0.28			
	70-72	---	---	---	---	---	-------------	----			
LrE2, LrF:											
Lowell	0-7	12-27	1.20-1.40	0.6-2.0	0.18-0.23	4.5-6.5	Low	0.37	3	---	1-4
	7-48	35-60	1.30-1.60	0.2-2.0	0.13-0.19	4.5-6.5	High	0.28			
	48-60	40-60	1.50-1.70	0.2-0.6	0.12-0.17	5.1-7.8	High	0.28			
Gilpin	0-2	15-27	1.20-1.40	0.6-2.0	0.12-0.16	3.6-5.5	Low	0.24	3	---	.5-4
	2-12	18-35	1.20-1.50	0.6-2.0	0.12-0.16	3.6-5.5	Low	0.24			
	12-22	15-35	1.20-1.50	0.6-2.0	0.08-0.12	3.6-5.5	Low	0.24			
	22-24	---	---	---	---	---	-------------	----			
Lu	0-16	27-40	1.30-1.55	0.2-0.6	0.21-0.23	5.6-7.3	Moderate	0.32	5	7	4-8
Luray	16-55	25-35	1.45-1.65	0.2-0.6	0.18-0.22	5.6-7.3	Moderate	0.32			
	55-60	15-30	1.45-1.60	0.2-2.0	0.14-0.18	6.1-8.4	Low	0.32			
MaB	0-7	20-27	1.30-1.45	0.6-2.0	0.22-0.24	5.1-7.3	Low	0.43	3	6	1-3
Markland	7-28	40-55	1.55-1.65	0.06-0.2	0.11-0.13	5.1-7.3	High	0.32			
	28-80	35-50	1.55-1.70	0.06-0.2	0.09-0.11	7.4-8.4	High	0.32			

TABLE 19.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	g/cc	In/hr	In/in	pH					Pct
MbC2--------------	0-6	28-40	1.35-1.50	0.2-0.6	0.18-0.20	5.1-7.3	Moderate-----	0.43	2	7	1-3
Markland	6-30	40-55	1.55-1.65	0.06-0.2	0.11-0.13	5.1-7.3	High---------	0.32			
	30-80	35-50	1.55-1.70	0.06-0.2	0.09-0.11	7.4-8.4	High---------	0.32			
McD2:											
Markland--------	0-7	28-40	1.35-1.50	0.2-0.6	0.18-0.20	5.1-7.3	Moderate-----	0.43	2	7	1-3
	7-31	40-55	1.55-1.65	0.06-0.2	0.11-0.13	5.1-7.3	High---------	0.32			
	31-80	35-50	1.55-1.70	0.06-0.2	0.09-0.11	7.4-8.4	High---------	0.32			
Glenford--------	0-8	15-27	1.30-1.45	0.6-2.0	0.16-0.20	4.5-7.3	Low----------	0.37	5-4	6	1-3
	8-30	18-35	1.45-1.65	0.2-2.0	0.14-0.18	4.5-6.0	Moderate-----	0.43			
	30-60	15-30	1.40-1.60	0.2-2.0	0.12-0.17	5.6-7.8	Low----------	0.37			
MdA--------------	0-6	22-27	1.35-1.50	0.6-2.0	0.22-0.24	6.1-7.3	Low----------	0.43	3	6	1-4
McGary	6-40	35-50	1.60-1.70	0.06-0.2	0.11-0.13	5.6-7.8	High---------	0.32			
	40-60	35-50	1.55-1.65	<0.2	0.14-0.16	7.4-8.4	High---------	0.32			
Me---------------	0-3	12-17	1.20-1.60	0.6-2.0	0.18-0.23	5.6-7.8	Low----------	0.43	5	---	.5-3
Melvin	3-44	12-35	1.30-1.60	0.6-2.0	0.18-0.23	5.6-7.8	Low----------	0.43			
	44-60	7-35	1.40-1.70	0.6-2.0	0.16-0.23	5.6-7.8	Low----------	0.43			
MkD--------------	0-7	10-24	1.20-1.40	0.6-2.0	0.07-0.12	5.1-7.3	Low----------	0.28	4	8	1-3
Mertz	7-30	15-35	1.40-1.60	0.2-0.6	0.08-0.18	4.5-7.3	Low----------	0.17			
	30-60	15-35	1.40-1.60	0.2-0.6	0.08-0.18	4.5-5.5	Low----------	0.17			
MrB, MrD, MrF----	0-5	27-40	1.50-1.75	0.2-0.6	0.07-0.14	6.1-8.4	Moderate-----	0.32	5	8	<.5
Morristown	5-60	20-35	1.65-1.90	0.2-0.6	0.03-0.11	7.4-8.4	Moderate-----	0.32			
MsB, MsC, MsD,											
MsE-------------	0-8	27-40	1.40-1.65	0.2-0.6	0.13-0.18	6.1-8.4	Moderate-----	0.43	2	4L	.5-2
Morristown	8-60	20-35	1.65-1.90	0.2-0.6	0.03-0.11	7.4-8.4	Moderate-----	0.32			
Ne---------------	0-11	7-27	1.20-1.40	0.6-2.0	0.15-0.23	5.6-7.8	Low----------	0.43	5	5	1-4
Newark	11-32	18-35	1.20-1.45	0.6-2.0	0.18-0.23	5.6-7.8	Low----------	0.43			
	32-60	12-40	1.30-1.50	0.6-2.0	0.15-0.22	5.6-7.8	Low----------	0.43			
No---------------	0-7	12-35	1.20-1.40	0.6-2.0	0.18-0.23	5.6-8.4	Low----------	0.43	5	---	2-4
Nolin	7-60	18-35	1.25-1.50	0.6-2.0	0.18-0.23	5.6-8.4	Low----------	0.43			
OmB, OmC---------	0-8	12-18	1.25-1.40	0.6-2.0	0.22-0.24	4.5-7.3	Low----------	0.43	4	5	.5-2
Omulga	8-24	20-35	1.30-1.45	0.6-2.0	0.18-0.22	3.6-5.5	Moderate-----	0.43			
	24-44	18-30	1.60-1.80	0.06-0.2	0.06-0.08	3.6-6.5	Moderate-----	0.43			
	44-58	20-35	1.50-1.60	0.2-0.6	0.18-0.21	4.5-7.3	Moderate-----	0.43			
	58-66	22-45	1.50-1.60	0.2-0.6	0.10-0.18	4.5-7.3	Moderate-----	0.32			
RaB--------------	0-10	12-20	1.35-1.50	0.6-2.0	0.18-0.22	4.5-7.3	Low----------	0.32	4-3	5	1-3
Rawson	10-38	18-35	1.50-1.70	0.6-2.0	0.12-0.16	5.1-7.8	Low----------	0.32			
	38-65	35-55	1.60-1.85	<0.2	0.08-0.12	6.6-8.4	Moderate-----	0.32			
RfC--------------	0-10	7-18	1.20-1.40	2.0-6.0	0.09-0.15	4.5-7.3	Low----------	0.24	4	---	.5-3
Rigley	10-40	7-18	1.30-1.60	2.0-6.0	0.09-0.15	3.6-5.5	Low----------	0.17			
	40-80	7-40	1.30-1.60	2.0-6.0	0.07-0.15	3.6-5.5	Low----------	0.17			
RgD--------------	0-6	7-18	1.20-1.40	2.0-6.0	0.09-0.15	4.5-7.3	Low----------	0.17	4	8	.5-3
Rigley	6-32	7-18	1.30-1.60	2.0-6.0	0.09-0.15	3.6-5.5	Low----------	0.17			
	32-60	7-40	1.30-1.60	2.0-6.0	0.07-0.15	3.6-5.5	Low----------	0.17			
RhE:											
Rigley----------	0-6	7-18	1.20-1.40	2.0-6.0	0.09-0.15	4.5-7.3	Low----------	0.17	4	8	.5-3
	6-32	7-18	1.30-1.60	2.0-6.0	0.09-0.15	3.6-5.5	Low----------	0.17			
	32-60	7-40	1.30-1.60	2.0-6.0	0.07-0.15	3.6-5.5	Low----------	0.17			

TABLE 19.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	g/cc	In/hr	In/in	pH					Pct
RhE:											
Coshocton-------	0-6	15-23	1.30-1.50	0.6-2.0	0.18-0.23	3.6-7.3	Low----------	0.37	5-4	5	1-3
	6-43	24-35	1.40-1.65	0.06-0.6	0.10-0.17	3.6-5.5	Moderate-----	0.37			
	43-48	24-36	1.45-1.70	0.06-0.6	0.08-0.12	4.5-6.0	Moderate-----	0.28			
	48-50	---	---	---	---	---	-------------	----			
RoF-------------- Rodman	0-12	5-20	1.10-1.40	2.0-6.0	0.09-0.12	6.1-7.8	Low----------	0.15	3	8	2-4
	12-20	5-25	1.10-1.50	2.0-6.0	0.09-0.12	6.1-7.8	Low----------	0.20			
	20-60	0-10	1.60-1.70	>20	0.02-0.04	6.6-8.4	Low----------	0.10			
Se--------------- Sebring	0-10	18-27	1.30-1.45	0.6-2.0	0.18-0.22	4.5-7.3	Low----------	0.37	5	6	3-5
	10-55	22-35	1.45-1.65	0.2-0.6	0.14-0.18	5.1-7.3	Moderate-----	0.37			
	55-60	15-30	1.40-1.60	0.2-2.0	0.12-0.16	6.1-8.4	Moderate-----	0.37			
St--------------- Stonelick	0-6	10-22	1.20-1.45	0.6-2.0	0.15-0.20	7.4-8.4	Low----------	0.32	5	5	1-3
	6-75	5-18	1.30-1.55	2.0-6.0	0.08-0.14	7.4-8.4	Low----------	0.24			
Ta--------------- Tioga	0-8	5-18	1.15-1.40	0.6-6.0	0.15-0.21	5.1-7.3	Low----------	0.37	5	---	2-6
	8-34	5-18	1.15-1.45	0.6-6.0	0.07-0.20	5.1-7.3	Low----------	0.28			
	34-60	3-15	1.25-1.55	0.6-20	0.02-0.20	5.6-7.8	Low----------	0.28			
Tf--------------- Tioga	0-20	5-18	1.15-1.40	0.6-6.0	0.15-0.21	5.1-7.3	Low----------	0.37	5	---	2-6
	20-38	5-18	1.15-1.45	0.6-6.0	0.07-0.20	5.1-7.3	Low----------	0.28			
	38-60	3-15	1.25-1.55	0.6-20	0.02-0.20	5.6-7.8	Low----------	0.28			
Ud, Ug, Uh. Udorthents											
Uk: Udorthents.											
Pits.											
UsB: Urban land.											
Glenford--------	0-9	15-27	1.30-1.45	0.6-2.0	0.16-0.20	4.5-7.3	Low----------	0.37	5-4	6	1-3
	9-40	18-35	1.45-1.65	0.2-0.6	0.13-0.17	5.6-7.3	Low----------	0.43			
	40-60	15-30	1.40-1.60	0.2-2.0	0.12-0.17	5.6-7.8	Low----------	0.37			
UtA: Urban land.											
Nolin-----------	0-7	12-35	1.20-1.40	0.6-2.0	0.18-0.23	5.6-8.4	Low----------	0.43	5	---	2-4
	7-60	18-35	1.25-1.50	0.6-2.0	0.18-0.23	5.6-8.4	Low----------	0.43			
UvB: Urban land.											
Watertown-------	0-10	5-15	1.20-1.60	2.0-6.0	0.10-0.14	4.5-7.3	Low----------	0.17	4	3	.5-2
	10-26	6-18	1.30-1.60	2.0-6.0	0.05-0.11	4.5-6.5	Low----------	0.10			
	26-60	2-10	1.30-1.60	6.0-20	0.04-0.06	4.5-6.5	Low----------	0.10			
UwC: Urban land.											
Wellston--------	0-7	13-27	1.30-1.50	0.6-2.0	0.18-0.22	5.1-6.5	Low----------	0.37	4-3	6	1-3
	7-30	18-35	1.30-1.65	0.6-2.0	0.17-0.21	4.5-6.0	Low----------	0.37			
	30-54	15-30	1.30-1.60	0.6-2.0	0.12-0.17	4.5-6.0	Low----------	0.37			
	54-60	15-30	1.30-1.60	0.6-2.0	0.06-0.16	4.5-6.0	Low----------	0.20			

TABLE 19.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	g/cc	In/hr	In/in	pH					Pct
WaB, WaC--------- Watertown	0-12	5-15	1.20-1.60	2.0-6.0	0.10-0.14	4.5-7.3	Low-----------	0.17	4	3	.5-2
	12-25	6-18	1.30-1.60	2.0-6.0	0.05-0.11	4.5-6.5	Low-----------	0.10			
	25-42	2-10	1.30-1.60	6.0-20	0.04-0.06	4.5-6.5	Low-----------	0.10			
	42-80	0-5	1.40-1.70	6.0-20	0.03-0.06	5.1-7.8	Low-----------	0.10			
WhB, WhC2-------- Wellston	0-7	13-27	1.30-1.50	0.6-2.0	0.18-0.22	5.1-6.5	Low-----------	0.37	4-3	6	1-3
	7-48	18-35	1.30-1.65	0.6-2.0	0.17-0.21	4.5-6.5	Low-----------	0.37			
	48-50	---	---	---	---	---	--------------	----			
WmB, WmC2-------- Westgate	0-7	14-27	1.30-1.50	0.6-2.0	0.20-0.24	3.6-7.3	Low-----------	0.43	4	6	1-3
	7-34	25-35	1.30-1.50	0.6-2.0	0.17-0.22	4.5-6.0	Moderate------	0.43			
	34-57	35-60	1.40-1.60	0.06-0.2	0.15-0.18	5.1-7.3	High----------	0.32			
	57-75	32-55	1.40-1.60	0.06-0.2	0.10-0.15	6.6-8.4	High----------	0.32			
	75-80	---	---	---	---	---	--------------	----			
WtC2, WtD2------- Westmoreland	0-6	15-30	1.20-1.40	0.6-2.0	0.16-0.20	4.5-6.0	Low-----------	0.37	3	5	1-4
	6-32	20-35	1.20-1.50	0.6-2.0	0.12-0.18	4.5-6.0	Low-----------	0.28			
	32-44	18-35	1.20-1.50	0.6-2.0	0.06-0.10	5.1-6.0	Low-----------	0.17			
	44-50	---	---	---	---	---	--------------	----			
WtE-------------- Westmoreland	0-9	15-30	1.20-1.40	0.6-2.0	0.16-0.20	4.5-6.0	Low-----------	0.37	3	5	1-4
	9-45	20-35	1.20-1.50	0.6-2.0	0.12-0.18	4.5-6.0	Low-----------	0.28			
	45-60	18-35	1.20-1.50	0.6-2.0	0.06-0.10	5.1-6.0	Low-----------	0.17			
	60-70	---	---	---	---	---	--------------	----			
WuC2, WuD2, WuE2:											
Westmoreland----	0-9	15-30	1.20-1.40	0.6-2.0	0.16-0.20	4.5-6.0	Low-----------	0.37	3	5	1-4
	9-40	20-35	1.20-1.50	0.6-2.0	0.12-0.18	4.5-6.0	Low-----------	0.28			
	40-60	18-35	1.20-1.50	0.6-2.0	0.06-0.10	5.1-6.0	Low-----------	0.17			
	60-62	---	---	---	---	---	--------------	----			
Guernsey--------	0-8	13-27	1.30-1.50	0.6-2.0	0.19-0.24	4.5-7.3	Low-----------	0.43	3-2	6	1-3
	8-52	35-60	1.40-1.60	0.06-0.6	0.10-0.15	4.5-7.8	High----------	0.32			
	52-55	35-60	1.40-1.60	0.06-0.6	0.06-0.10	5.1-8.4	High----------	0.32			
	55-57	---	---	---	---	---	--------------	----			
WvD:											
Westmoreland----	0-9	15-30	1.20-1.40	0.6-2.0	0.16-0.20	4.5-6.0	Low-----------	0.37	3	5	1-4
	9-40	20-35	1.20-1.50	0.6-2.0	0.12-0.18	4.5-6.0	Low-----------	0.28			
	40-60	18-35	1.20-1.50	0.6-2.0	0.06-0.10	5.1-6.0	Low-----------	0.17			
	60-65	---	---	---	---	---	--------------	----			
Urban land.											
ZnB, ZnC2-------- Zanesville	0-7	12-27	1.35-1.40	0.6-2.0	0.19-0.23	4.5-6.0	Low-----------	0.43	3	---	1-2
	7-28	18-35	1.35-1.45	0.6-2.0	0.17-0.22	4.5-6.0	Low-----------	0.37			
	28-45	18-33	1.50-1.75	0.06-0.6	0.08-0.12	4.5-6.0	Low-----------	0.37			
	45-80	20-40	1.50-1.70	0.2-2.0	0.08-0.12	4.5-6.0	Low-----------	0.28			

TABLE 20.--SOIL AND WATER FEATURES

("Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
AaB, AaC2, AaD2 Aaron	C	None	---	---	1.5-3.0	Perched	Nov-Mar	40-60	Soft	High	High	Moderate.
AcB:												
Aaron	C	None	---	---	1.5-3.0	Perched	Nov-Mar	40-60	Soft	High	High	Moderate.
Upshur	D	None	---	---	>6.0	---	---	>40	Soft	Moderate	High	Moderate.
AfB, AfC2 Alford	B	None	---	---	>6.0	---	---	>60	---	High	Moderate	High.
BeB, BeD2, BeE Berks	C	None	---	---	>6.0	---	---	20-40	Soft	Low	Low	High.
BkF:												
Berks	C	None	---	---	>6.0	---	---	20-40	Soft	Low	Low	High.
Westmoreland	B	None	---	---	>6.0	---	---	>40	Hard	Moderate	Low	High.
BoB, BoD, BpF Bethesda	C	None	---	---	>6.0	---	---	>60	---	Moderate	High	High.
BsC2, BsE Brookside	C	None	---	---	2.5-4.0	Perched	Mar-Jun	>60	---	Moderate	Moderate	Moderate.
Cb Chagrin	B	Rare	---	---	4.0-6.0	Apparent	Feb-Mar	>60	---	Moderate	Low	Moderate.
CcA, CcB Chavies	B	None	---	---	>6.0	---	---	>60	---	---	Low	Moderate.
CeA, CeB, ChA, ChB, ChC Chili	B	None	---	---	>6.0	---	---	>60	---	Moderate	Low	High.
CkA Cidermill	B	None	---	---	>6.0	---	---	>60	---	Moderate	Low	High.
CnB, CnC2 Cincinnati	C	None	---	---	2.5-4.0	Perched	Jan-Apr	>60	---	High	Moderate	High.
CpC2 Clarksburg	C	None	---	---	1.5-3.0	Perched	Nov-Mar	>60	---	Moderate	Moderate	Moderate.

TABLE 20.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
CrC:												
Claysville	C	None	---	---	1.0-2.0	Perched	Nov-Jun	>60	---	High	High	Low.
Guernsey	C	None	---	---	1.5-3.0	Perched	Jan-Apr	>50	Soft	High	High	Moderate.
CsC2, CsD Coshocton	C	None	---	---	1.5-3.0	Perched	Jan-Apr	40-84	Soft	High	High	High.
CtE:												
Coshocton	C	None	---	---	1.5-3.0	Perched	Jan-Apr	40-84	Soft	High	High	High.
Westmoreland	B	None	---	---	>6.0	---	---	>40	Hard	Moderate	Low	High.
Ds. Dumps and Pits												
FaB, FaD, FaE, FbF Fairpoint	C	None	---	---	>6.0	---	---	>60	---	Moderate	High	Moderate.
FcA, FcB Fitchville	C	None	---	---	1.0-2.5	Perched	Nov-May	>60	---	High	High	Moderate.
FkB:												
Frankstown Variant	B	None	---	---	>6.0	---	---	20-40	Hard	Moderate	Low	High.
Mertz	C	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate	High.
GdB, GdC2 Gilpin	C	None	---	---	>6.0	---	---	20-40	Soft	Moderate	Low	High.
GeD2, GeE2:												
Gilpin	C	None	---	---	>6.0	---	---	20-40	Soft	Moderate	Low	High.
Upshur	D	None	---	---	>6.0	---	---	>40	Soft	Moderate	High	Moderate.
GfA, GfB, GfC2 Glenford	C	None	---	---	2.0-3.5	Perched	Nov-May	>60	---	High	Moderate	Moderate.
GtC2, GtD2:												
Guernsey	C	None	---	---	1.5-3.0	Perched	Jan-Apr	>50	Soft	High	High	Moderate.
Upshur	D	None	---	---	>6.0	---	---	>40	Soft	Moderate	High	Moderate.
HaC2, HaD2 Homewood	C	None	---	---	2.5-4.0	Perched	Nov-Apr	>60	---	Moderate	Low	Moderate.

TABLE 20.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
JtA Jimtown	C	None	---	---	1.0-2.5	Apparent	Dec-May	>60	---	High	High	High.
KeB, KeC2 Keene	C	None	---	---	1.5-3.0	Perched	Jan-Apr	40-84	Soft	High	High	High.
Km Killbuck	C/D	Occasional	Brief	Jan-Dec	0-1.0	Apparent	Nov-Jun	>60	---	High	High	Moderate.
LaC Lakin	A	None	---	---	>6.0	---	---	>60	---	Low	Low	High.
LcD:												
Lakin	A	None	---	---	>6.0	---	---	>60	---	Low	Low	High.
Alford	B	None	---	---	>6.0	---	---	>60	---	High	Moderate	High.
Lk Lindside	C	Occasional	Very brief or brief.	Dec-Apr	1.5-3.0	Apparent	Dec-Apr	>60	---	High	Moderate	Low.
Lm Lobdell	B	Occasional	Brief	Jan-Apr	2.0-3.5	Apparent	Dec-Apr	>60	---	High	Low	Moderate.
Lo Lorain	C/D	None	---	---	+1-1.0	Perched	Jan-Apr	>60	---	High	High	Moderate.
LpC2, LpD2 Lowell	C	None	---	---	2.5-5.0	Perched	Jan-Mar	>40	Hard	Moderate	High	Moderate.
LrE2, LrF:												
Lowell	C	None	---	---	>6.0	---	---	>40	Hard	Moderate	High	Moderate.
Gilpin	C	None	---	---	>6.0	---	---	20-40	Soft	Moderate	Low	High.
Lu Luray	C/D	None	---	---	+1-1.0	Apparent	Nov-Jul	>60	---	High	High	Low.
MaB, MbC2 Markland	C	None	---	---	3.0-6.0	Perched	Mar-Apr	>60	---	Moderate	High	Moderate.
McD2:												
Markland	C	None	---	---	3.0-6.0	Perched	Mar-Apr	>60	---	Moderate	High	Moderate.
Glenford	C	None	---	---	2.0-3.5	Perched	Nov-May	>60	---	High	Moderate	Moderate.
MdA McGary	C	None	---	---	1.0-3.0	Apparent	Jan-Apr	>60	---	Moderate	High	Low.

TABLE 20.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
Me----------------- Melvin	D	Frequent----	Brief-----	Dec-May	0-1.0	Apparent	Dec-May	>60	---	High-----	High-----	Low.
MkD---------------- Mertz	C	None--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate	High.
MrB, MrD, MrF, MsB, MsC, MsD, MsE--------------- Morristown	C	None--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Low.
Ne----------------- Newark	C	Frequent----	Brief-----	Jan-Apr	0.5-1.5	Apparent	Dec-May	>60	---	High-----	High-----	Low.
No----------------- Nolin	B	Occasional	Brief-----	Feb-May	3.0-6.0	Apparent	Feb-Mar	>60	---	High-----	Low------	Moderate.
OmB, OmC----------- Omulga	C	None--------	---	---	2.0-3.5	Perched	Jan-Apr	>60	---	High-----	Moderate	High.
RaB---------------- Rawson	B	None--------	---	---	1.5-3.0	Perched	Jan-Apr	>60	---	Moderate	High-----	High.
RfC, RgD----------- Rigley	B	None--------	---	---	>6.0	---	---	>60	---	---	Low------	High.
RhE:												
Rigley------------	B	None--------	---	---	>6.0	---	---	>60	---	---	Low------	High.
Coshocton---------	C	None--------	---	---	1.5-3.0	Perched	Jan-Apr	40-84	Soft	High-----	High-----	High.
RoF---------------- Rodman	A	None--------	---	---	>6.0	---	---	>60	---	Low------	Low------	Low.
Se----------------- Sebring	B/D	None--------	---	---	+1-1.0	Apparent	Nov-Jun	>60	---	High-----	High-----	Moderate.
St----------------- Stonelick	B	Occasional	Brief-----	Nov-Jun	>6.0	---	---	>60	---	Moderate	Low------	Low.
Ta----------------- Tioga	B	Rare--------	---	---	3.0-6.0	Apparent	Feb-Apr	>60	---	Moderate	Low------	Moderate.
Tf----------------- Tioga	B	Occasional	Brief-----	Nov-May	3.0-6.0	Apparent	Feb-Apr	>60	---	Moderate	Low------	Moderate.
Ud, Ug, Uh. Udorthents												

TABLE 20.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
Uk:												
Udorthents.												
Pits.												
UsB:												
Urban land.												
Glenford----------	C	None---------	---	---	2.0-3.5	Perched	Nov-May	>60	---	High-----	Moderate	Moderate.
UtA:												
Urban land.												
Nolin-------------	B	Rare---------	---	---	3.0-6.0	Apparent	Feb-Mar	>60	---	---	Low------	Moderate.
UvB:												
Urban land.												
Watertown---------	B	None---------	---	---	>6.0	---	---	>60	---	Moderate	Low------	High.
UwC:												
Urban land.												
Wellston----------	B	None---------	---	---	>6.0	---	---	>40	Soft	High-----	Moderate	High.
WaB, WaC---------- Watertown	B	None---------	---	---	>6.0	---	---	>60	---	Moderate	Low------	High.
WhB, WhC2--------- Wellston	B	None---------	---	---	>6.0	---	---	>40	Soft	High-----	Moderate	High.
WmB, WmC2--------- Westgate	C	None---------	---	---	2.0-3.5	Perched	Dec-Apr	60-80	Soft	High-----	High-----	Moderate.
WtC2, WtD2, WtE--- Westmoreland	B	None---------	---	---	>6.0	---	---	>40	Hard	Moderate	Low------	High.
WuC2, WuD2, WuE2:												
Westmoreland----	B	None---------	---	---	>6.0	---	---	>40	Hard	Moderate	Low------	High.
Guernsey---------	C	None---------	---	---	1.5-3.0	Perched	Jan-Apr	>50	Soft	High-----	High-----	Moderate.
WvD:												
Westmoreland-----	B	None---------	---	---	>6.0	---	---	>40	Hard	Moderate	Low------	High.
Urban land.												
ZnB, ZnC2--------- Zanesville	C	None---------	---	---	2.0-3.0	Perched	Dec-Apr	>60	Hard	High-----	Moderate	High.

TABLE 21.--ENGINEERING INDEX TEST DATA

(Tests performed by State of Ohio, Department of Transportation, Division of Highways, Testing Laboratory. Dashes indicate that data were not available. RN means report number; HO, horizon; MAX, maximum dry density; OPT, optimum moisture; LL, liquid limit; PI, plasticity index; AA, AASHTO; UN, Unified; and NP, nonplastic)

Soil name and location	Parent material	RN	Depth	HO	Moisture density		Mechanical analysis							LL	PI	Classification	
							Percentage passing sieve--				Percentage smaller than--						
					MAX	OPT	No. 4	No. 10	No. 40	No. 200	0.02 mm	0.005 mm	0.002 mm			AA	UN
			In		Lb/ cu ft	Pct								Pct			
Alford silt loam: 6 miles north of Zanesville, in Muskingum Township; 3,400 feet west and 2,000 feet north of the southeast corner of sec. 21, T. 2 N., R. 8 W.	Loess	MS-26															
		37761	0-10	Ap	105	17	100	100	100	98	---	24	---	28	6	A-4	CL-ML
		37762	20-30	Bt2	108	17	100	100	100	99	---	31	---	36	16	A-6	CL
		37763	50-65	C	113	16	100	100	100	99	---	24	---	28	7	A-4	CL-ML
Claysville silty clay loam: 3.5 miles east of Gaysport, in Bluerock Township; 2,400 feet east of Imlay Road intersection along Cutler Lake Road, and 300 feet north of road; in sec. 24, T. 12 N., R. 12 W.	Colluvium from clay shale, limestone, and siltstone	MS-32															
		47023	0-13	A	95	24	100	100	97	92	---	52	---	53	27	A-7	CH
		47024	13-54	B	110	16	97	89	83	76	---	49	---	57	33	A-7	CH
		47025	54-75	C	107	17	90	79	75	73	---	50	---	50	28	A-7	CL, CH

TABLE 21.--ENGINEERING INDEX TEST DATA--Continued

Soil name and location	Parent material	RN	Depth	HO	Moisture density MAX	Moisture density OPT	Mechanical analysis: Percentage passing sieve-- No. 4	No. 10	No. 40	No. 200	Percentage smaller than-- 0.02 mm	0.005 mm	0.002 mm	LL	PI	Classification AA	Classification UN
			In		Lb/ cu ft	Pct								Pct			
Keene silt loam: 6.0 miles southwest of Dresden, in Licking Township; 1,400 feet east along old Stagecoach Road from the intersection with Baker Road, and 150 feet south; T. 2 N., R. 9 W.	Loess and the underlying residuum of clay shale and siltstone	MS-25															
		37757	0-8	Ap	105	18	100	100	97	94	---	23	---	34	10	A-4	CL-ML
		37758	13-22	Bt1	108	18	100	100	99	96	---	30	---	34	9	A-4	CL-ML
		37759	30-38	Bt3	109	18	99	96	91	85	---	47	---	37	12	A-6	CL-ML
		37760	58-74	2C	106	19	99	95	88	81	---	57	---	36	12	A-6	CL-ML
Westgate silt loam: 3.5 miles southeast of Duncan Falls, in Bluerock Township; about 1,710 feet south and 1,740 feet west of the northeast corner of sec. 3, T. 12 N., R. 12 W.	Loess and the underlying residuum of siltstone, clay shale, and limestone	MS-28															
		45110	1-7	Ap	107	15	100	100	99	97	---	30	---	---	NP	A-4	ML
		45111	18-28	Bt2	109	18	100	100	99	98	---	44	---	40	25	A-6	CL
		45112	43-57	2Bt5	116	15	100	100	100	98	---	55	---	40	20	A-6	CL
		45113	75-118	2Cr	113	17	100	100	98	95	---	52	---	46	22	A-7	CL

TABLE 22.--CLASSIFICATION OF THE SOILS

(An asterisk in the first column indicates that the soil is a taxadjunct to the series. See text for a description of those characteristics of the soil that are outside the range of the series)

Soil name	Family or higher taxonomic class
Aaron	Fine, mixed, mesic Aquic Hapludalfs
Alford	Fine-silty, mixed, mesic Typic Hapludalfs
Berks	Loamy-skeletal, mixed, mesic Typic Dystrochrepts
Bethesda	Loamy-skeletal, mixed, acid, mesic Typic Udorthents
Brookside	Fine, mixed, mesic Typic Hapludalfs
Chagrin	Fine-loamy, mixed, mesic Dystric Fluventic Eutrochrepts
Chavies	Coarse-loamy, mixed, mesic Ultic Hapludalfs
Chili	Fine-loamy, mixed, mesic Typic Hapludalfs
Cidermill	Fine-silty, mixed, mesic Ultic Hapludalfs
Cincinnati	Fine-silty, mixed, mesic Typic Fragiudalfs
Clarksburg	Fine-loamy, mixed, mesic Typic Fragiudalfs
Claysville	Fine, mixed, mesic Aquic Hapludolls
Coshocton	Fine-loamy, mixed, mesic Aquultic Hapludalfs
Fairpoint	Loamy-skeletal, mixed, nonacid, mesic Typic Udorthents
Fitchville	Fine-silty, mixed, mesic Aeric Ochraqualfs
Frankstown Variant	Fine-loamy, mixed, mesic Typic Hapludults
Gilpin	Fine-loamy, mixed, mesic Typic Hapludults
Glenford	Fine-silty, mixed, mesic Aquic Hapludalfs
Guernsey	Fine, mixed, mesic Aquic Hapludalfs
Homewood	Fine-loamy, mixed, mesic Typic Fragiudalfs
Jimtown	Fine-loamy, mixed, mesic Aeric Ochraqualfs
Keene	Fine-silty, mixed, mesic Aquic Hapludalfs
Killbuck	Fine-silty, mixed, nonacid, mesic Typic Fluvaquents
Lakin	Mixed, mesic Alfic Udipsamments
Lindside	Fine-silty, mixed, mesic Fluvaquentic Eutrochrepts
Lobdell	Fine-loamy, mixed, mesic Fluvaquentic Eutrochrepts
Lorain	Fine, illitic, mesic Mollic Ochraqualfs
Lowell	Fine, mixed, mesic Typic Hapludalfs
Luray	Fine-silty, mixed, mesic Typic Argiaquolls
Markland	Fine, mixed, mesic Typic Hapludalfs
McGary	Fine, mixed, mesic Aeric Ochraqualfs
Melvin	Fine-silty, mixed, nonacid, mesic Typic Fluvaquents
Mertz	Loamy-skeletal, mixed, mesic Typic Hapludults
Morristown	Loamy-skeletal, mixed (calcareous), mesic Typic Udorthents
Newark	Fine-silty, mixed, nonacid, mesic Aeric Fluvaquents
*Nolin	Fine-silty, mixed, mesic Dystric Fluventic Eutrochrepts
Omulga	Fine-silty, mixed, mesic Typic Fragiudalfs
*Rawson	Fine-loamy, mixed, mesic Typic Hapludalfs
Rigley	Coarse-loamy, mixed, mesic Typic Hapludults
Rodman	Sandy-skeletal, mixed, mesic Typic Hapludolls
Sebring	Fine-silty, mixed, mesic Typic Ochraqualfs
Stonelick	Coarse-loamy, mixed (calcareous), mesic Typic Udifluvents
Tioga	Coarse-loamy, mixed, mesic Dystric Fluventic Eutrochrepts
Udorthents	Udorthents
Upshur	Fine, mixed, mesic Typic Hapludalfs
Watertown	Coarse-loamy, mixed, mesic Ultic Hapludalfs
Wellston	Fine-silty, mixed, mesic Ultic Hapludalfs
Westgate	Fine-silty, mixed, mesic Typic Hapludalfs
Westmoreland	Fine-loamy, mixed, mesic Ultic Hapludalfs
Zanesville	Fine-silty, mixed, mesic Typic Fragiudalfs

Interpretive Groups

INTERPRETIVE GROUPS

(Dashes indicate that the soil is not assigned to the interpretive group)

Map symbol and soil name	Land capability	Pasture and hayland suitability group	Woodland ordination symbol (north/south aspect)	Prime farmland
AaB Aaron	IIe	A-6	4C	Yes
AaC2 Aaron	IIIe	A-6	4C	No
AaD2 Aaron	IVe	A-2	4R	No
AcB:				
Aaron	IIe	A-6	4C	Yes
Upshur	IIe	F-5	3C	Yes
AfB Alford	IIe	A-6	5A	Yes
AfC2 Alford	IIIe	A-6	5A	No
BeB Berks	IIe	F-1	4F	No
BeD2 Berks	IVe	F-1	4R/3R	No
BeE Berks	VIe	F-2	4R/3R	No
BkF:				
Berks	VIIe	H-1	4R/3R	No
Westmoreland	VIIe	H-1	4R	No
BoB, BoD Bethesda	VIs	E-3	---	No
BpF Bethesda	VIIe	H-1	---	No
BsC2 Brookside	IIIe	A-1	5A	No
BsE Brookside	VIe	A-3	5R/4R	No
Cb Chagrin	I	A-5	5A	Yes
CcA Chavies	I	A-1	4A	Yes
CcB Chavies	IIe	A-1	4A	Yes
CeA Chili	IIs	A-1	4A	Yes

INTERPRETIVE GROUPS--Continued

Map symbol and soil name	Land capability	Pasture and hayland suitability group	Woodland ordination symbol (north/south aspect)	Prime farmland
CeB---------------- Chili	IIe	A-1	4A	Yes
ChA---------------- Chili	IIs	A-1	4A	Yes
ChB---------------- Chili	IIe	A-1	4A	Yes
ChC---------------- Chili	IIIe	A-1	4A	No
CkA---------------- Cidermill	I	A-1	5A	Yes
CnB---------------- Cincinnati	IIe	F-3	4A	Yes
CnC2--------------- Cincinnati	IIIe	F-3	4A	No
CpC2--------------- Clarksburg	IIIe	F-3	4A	No
CrC:				
Claysville--------	IIIw	C-2	---	No
Guernsey----------	IIIw	A-6	4A	No
CsC2--------------- Coshocton	IIIe	A-6	4A	No
CsD---------------- Coshocton	IVe	A-2	4R/3R	No
CtE:				
Coshocton---------	VIe	A-3	4R/3R	No
Westmoreland------	VIe	A-3	4R	No
Ds. Dumps and Pits				
FaB---------------- Fairpoint	IIIs	B-4	---	No
FaD---------------- Fairpoint	IVs	B-4	---	No
FaE---------------- Fairpoint	VIe	E-2	---	No
FbF---------------- Fairpoint	VIIe	H-1	---	No
FcA---------------- Fitchville	IIw	C-1	5A	Yes*
FcB---------------- Fitchville	IIe	C-1	5A	Yes*

INTERPRETIVE GROUPS--Continued

Map symbol and soil name	Land capability	Pasture and hayland suitability group	Woodland ordination symbol (north/south aspect)	Prime farmland
FkB:				
Frankstown Variant	IIe	F-1	4D	No
Mertz-------------	IIe	B-1	4F	No
GdB---------------- Gilpin	IIe	F-1	4A	Yes
GdC2--------------- Gilpin	IIIe	F-1	4A	No
GeD2:				
Gilpin------------	IVe	F-1	4R	No
Upshur------------	IVe	F-5	4R/3R	No
GeE2:				
Gilpin------------	VIe	F-2	4R	No
Upshur------------	VIe	F-6	4R/3R	No
GfA---------------- Glenford	I	A-6	5A	Yes
GfB---------------- Glenford	IIe	A-6	5A	Yes
GfC2--------------- Glenford	IIIe	A-6	5A	No
GtC2:				
Guernsey----------	IVe	A-6	4A	No
Upshur------------	IVe	F-5	3C	No
GtD2:				
Guernsey----------	VIe	A-6	4R	No
Upshur------------	VIe	F-5	4R/3R	No
HaC2--------------- Homewood	IIIe	F-3	5D	No
HaD2--------------- Homewood	IVe	F-3	5R	No
JtA---------------- Jimtown	IIw	C-1	5A	Yes*
KeB---------------- Keene	IIe	A-6	4A	Yes
KeC2--------------- Keene	IIIe	A-6	4A	No
Km----------------- Killbuck	IIIw	C-3	5W	Yes*
LaC---------------- Lakin	IVs	B-1	3S	No

See footnotes at end of table.

INTERPRETIVE GROUPS--Continued

Map symbol and soil name	Land capability	Pasture and hayland suitability group	Woodland ordination symbol (north/south aspect)	Prime farmland
LcD:				
Lakin	IVe	B-1	3S	No
Alford	IVe	A-2	5R	No
Lk Lindside	IIw	A-5	5A	Yes
Lm Lobdell	IIw	A-5	5A	Yes
Lo Lorain	IIIw	C-2	5W	Yes*
LpC2 Lowell	IIIe	A-1	4C	No
LpD2 Lowell	IVe	A-2	4C/3C	No
LrE2:				
Lowell	VIe	A-3	5R	No
Gilpin	VIe	A-3	4R	No
LrF:				
Lowell	VIIe	H-1	5R	No
Gilpin	VIIe	H-1	4R	No
Lu Luray	IIw	C-1	5W	Yes*
MaB Markland	IIIe	F-5	4C	Yes
MbC2 Markland	IVe	F-5	4C	No
McD2:				
Markland	VIe	F-5	4R	No
Glenford	VIe	A-2	5R	No
MdA McGary	IIIw	C-2	4W	Yes*
Me Melvin	IIIw	C-3	4W	Yes**
MkD Mertz	VIe	A-3	4F	No
MrB, MrD Morristown	VIs	E-3	---	No
MrF Morristown	VIIe	H-1	---	No

See footnotes at end of table.

INTERPRETIVE GROUPS--Continued

Map symbol and soil name	Land capability	Pasture and hayland suitability group	Woodland ordination symbol (north/south aspect)	Prime farmland
MsB---------------- Morristown	IIIs	B-4	---	No
MsC, MsD----------- Morristown	IVs	B-4	---	No
MsE---------------- Morristown	VIe	E-2	---	No
Ne----------------- Newark	IIw	C-3	5W	Yes**
No----------------- Nolin	IIw	A-5	5A	Yes
OmB---------------- Omulga	IIe	F-3	4D	Yes
OmC---------------- Omulga	IIIe	F-3	4D	No
RaB---------------- Rawson	IIe	A-1	4A	Yes
RfC---------------- Rigley	IIIe	A-1	4A	No
RgD---------------- Rigley	IVe	A-2	4R/3R	No
RhE:				
Rigley------------	VIe	A-3	4R/3R	No
Coshocton---------	VIe	A-3	4R/3R	No
RoF---------------- Rodman	VIIs	H-1	4R	No
Se----------------- Sebring	IIIw	C-2	5W	Yes*
St----------------- Stonelick	IIw	A-5	4A	Yes
Ta----------------- Tioga	IIs	A-5	4A	Yes
Tf----------------- Tioga	IIw	A-5	4A	Yes
Ud, Ug, Uh. Udorthents				
Uk: Udorthents.				
Pits.				
UsB: Urban land.				

See footnotes at end of table.

INTERPRETIVE GROUPS--Continued

Map symbol and soil name	Land capability	Pasture and hayland suitability group	Woodland ordination symbol (north/south aspect)	Prime farmland
UsB:				
Glenford.				
UtA:				
Urban land.				
Nolin.				
UvB:				
Urban land.				
Watertown.				
UwC:				
Urban land.				
Wellston.				
WaB---------------- Watertown	IIIs	B-1	4A	No
WaC---------------- Watertown	IIIe	B-1	4A	No
WhB---------------- Wellston	IIe	A-6	4A	Yes
WhC2--------------- Wellston	IIIe	A-6	4A	No
WmB---------------- Westgate	IIe	A-6	4A	Yes
WmC2--------------- Westgate	IIIe	A-6	4A	No
WtC2--------------- Westmoreland	IIIe	A-1	4A	No
WtD2--------------- Westmoreland	IVe	A-2	4R	No
WtE---------------- Westmoreland	VIe	A-3	4R	No
WuC2:				
Westmoreland------	IIIe	A-1	4A	No
Guernsey----------	IIIe	A-6	4A	No
WuD2:				
Westmoreland------	IVe	A-2	4R	No
Guernsey----------	IVe	A-2	4R	No
WuE2:				
Westmoreland------	VIe	A-3	4R	No
Guernsey----------	VIe	A-3	4R	No

See footnotes at end of table.

INTERPRETIVE GROUPS--Continued

Map symbol and soil name	Land capability	Pasture and hayland suitability group	Woodland ordination symbol (north/south aspect)	Prime farmland
WvD:				
Westmoreland.				
Urban land.				
ZnB---------------- Zanesville	IIe	F-3	4A	Yes
ZnC2--------------- Zanesville	IIIe	F-3	4A	No

* Where drained.

** Where drained and either protected from flooding or not frequently flooded during the growing season.

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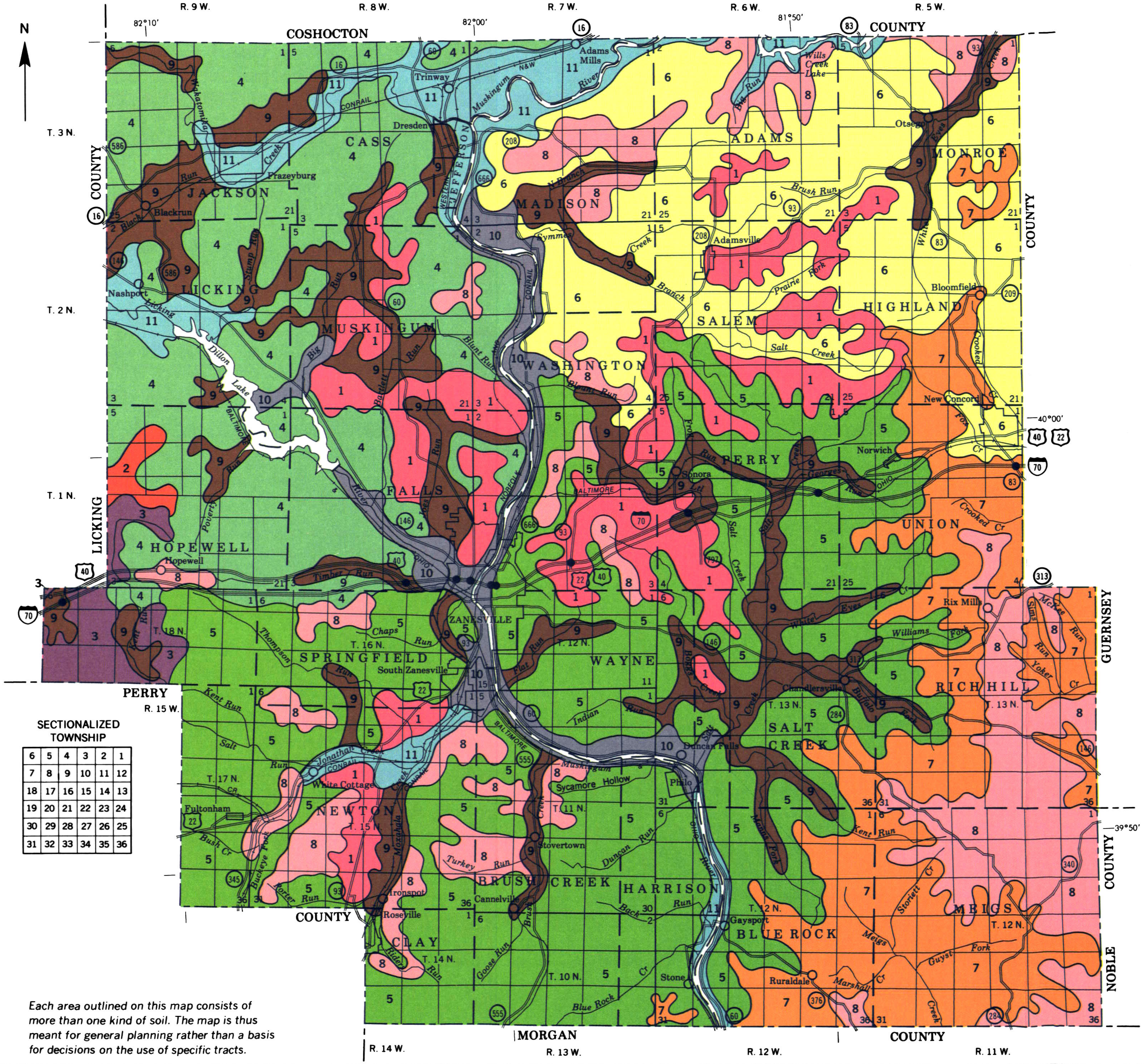
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COUNTY
LICKING
COUNTY
GUERNSEY
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NOBLE
PERRY
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MORGAN
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MADISON
ADAMS
MONROE
SALEM
HIGHLAND
WASHINGTON
FALLS
PERRY
UNION
HOPEWELL
SPRINGFIELD
WAYNE
RICH HILL
SALT CREEK
NEWTON
BRUSH CREEK
HARRISON
MEIGS
CLAY
BLUE ROCK
ZANESVILLE
South Zanesville
Dresden
Trinway
Adams Mills
Frazeyburg
Blackrun
Nashport
Hopewell
Adamsville
Otsego
Bloomfield
New Concord
Norwich
Sonora
Rix Mills
Chandlersville
Duncan Falls
Philo
Stovertown
White Cottage
Fultonham
Roseville
Ironspot
Cannelville
Gaysport
Stone
Ruraldale
Dillon Lake
Wills Creek Lake
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R. 14 W.
R. 13 W.
R. 12 W.
R. 11 W.
SECTIONALIZED TOWNSHIP
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19 20 21 22 23 24
30 29 28 27 26 25
31 32 33 34 35 36

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.

SOIL LEGEND*

1	Wellston-Zanesville-Alford association
2	Mertz-Keene-Frankstown Variant association
3	Cincinnati-Coshocton-Homewood association
4	Coshocton-Westmoreland-Keene association
5	Westmoreland-Berks-Guernsey association
6	Westmoreland-Coshocton-Rigley association
7	Lowell-Guernsey-Gilpin association
8	Morristown-Fairpoint-Bethesda association
9	Glenford-Newark-Fitchville association
10	Watertown-Chili-Glenford association
11	Tioga-Nolin-Newark association

* The units on this legend are described in the text under the heading "General Soil Map Units."

Compiled 1995

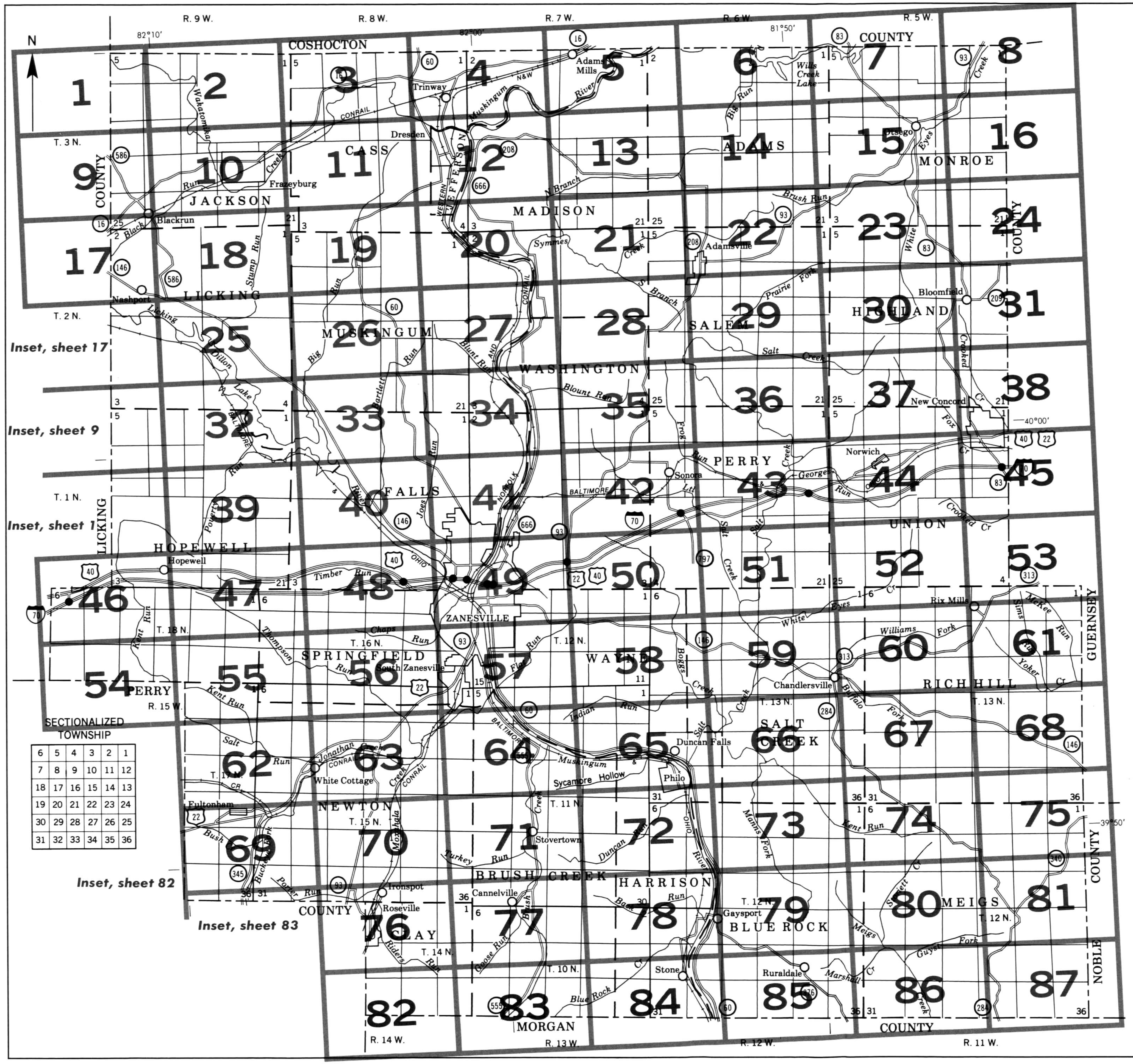
UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF SOIL AND WATER CONSERVATION
OHIO AGRICULTURAL RESEARCH AND DEVELOPMENT CENTER
OHIO COOPERATIVE EXTENSION SERVICE

GENERAL SOIL MAP
MUSKINGUM COUNTY, OHIO

Scale 1:190,080

1 0 1 2 3 Mi

1 0 3 6 Km


N
R. 9 W.
R. 8 W.
R. 7 W.
R. 6 W.
R. 5 W.
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COSHOCTON
COUNTY
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JACKSON
MADISON
ADAMS
MONROE
LICKING
MUSKINGUM
WASHINGTON
SALEM
HIGHLAND
PERRY
FALLS
UNION
HOPEWELL
SPRINGFIELD
WAYNE
RICH HILL
SALT CREEK
NEWTON
BRUSH CREEK
HARRISON
CLAY
BLUE ROCK
MEIGS
Trinway
Adams Mills
Dresden
Otsego
Frazeyburg
Blackrun
Nashport
Adamsville
Bloomfield
New Concord
Norwich
Sonora
Hopewell
ZANESVILLE
South Zanesville
Rix Mills
Chandlersville
Duncan Falls
Philo
White Cottage
Fultonham
Stovertown
Ironspot
Roseville
Cannelville
Gaysport
Stone
Ruraldale
Wills Creek Lake
Muskingum River
Wakatomika Creek
Black Run
Stump Run
Big Run
Licking
Dillon Lake
Bartlett Run
Blunt Run
Joes Run
Powell Run
Timber Run
Kent Run
Thompson
Chaps Run
Flint Run
Symmes Creek
N. Branch
S. Branch
Brush Run
Prairie Fork
Salt Creek
White Eyes Cr
Crooked Cr
Fox Cr
Frog Run
Georges Run
Williams Fork
Sims
McKee Run
Yoker Cr
Boggs Creek
Indian Run
Buffalo Fork
Jonathan Creek
Moxahala
Sycamore Hollow
Turkey Run
Duncan Run
Kent Run
Meigs Creek
Moores Fork
Bush Creek
Buckeye
Porter Run
Riders Run
Goose Run
Brush Creek
Baker Run
Blue Rock Cr
Marshall Cr
Guyst Fork
CONRAIL
N&W
BALTIMORE & OHIO
NORFOLK
WESTERN
Inset, sheet 17
Inset, sheet 9
Inset, sheet 1
Inset, sheet 82
Inset, sheet 83
T. 18 N.
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T. 12 N.
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T. 12 N.
R. 15 W.
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R. 13 W.
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40°00'
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GUERNSEY
COUNTY
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COUNTY
MORGAN
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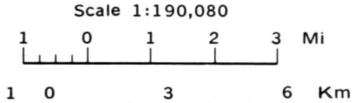
COUNTY
SECTIONALIZED TOWNSHIP
6 5 4 3 2 1
7 8 9 10 11 12
18 17 16 15 14 13
19 20 21 22 23 24
30 29 28 27 26 25
31 32 33 34 35 36

INDEX TO MAP SHEETS

MUSKINGUM COUNTY, OHIO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1 0 3 6 Km

UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MUSKINGUM COUNTY, OHIO

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF SOIL AND WATER CONSERVATION
OHIO AGRICULTURAL RESEARCH AND DEVELOPMENT CENTER
OHIO COOPERATIVE EXTENSION SERVICE

SOIL LEGEND

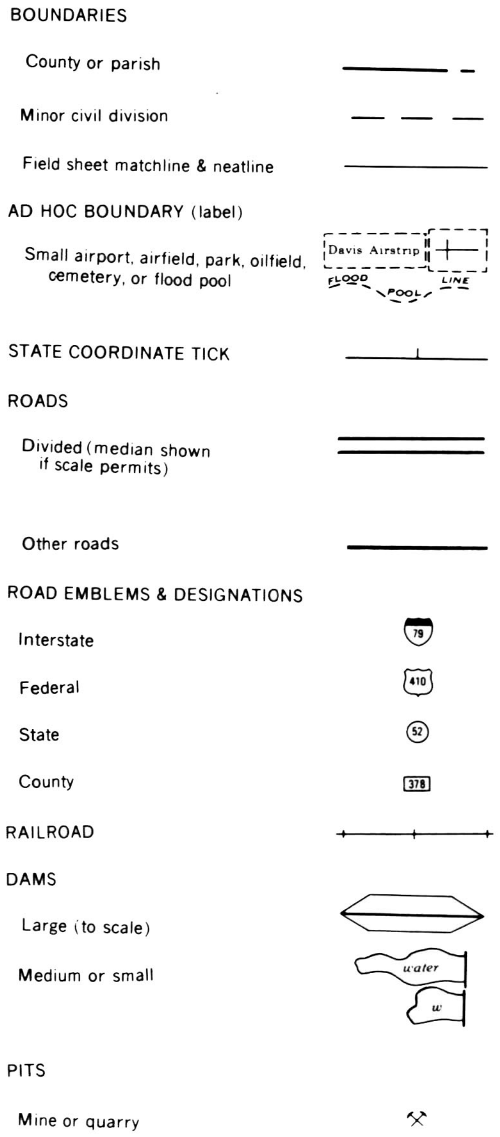
Map symbols consists of a combination of letters or letters and numbers. The first capital letter is the initial one of the map unit name. The lowercase letter that follows separates map units having names that begin with the same letter, except that it does not separate sloping or eroded phases. The second capital letter indicates the class of slope. Symbols without a slope letter are for nearly level soils or miscellaneous areas, or for map units named at taxonomic levels higher than soil series in the soil classification system. A final number of 2 indicates the soil is eroded.

SYMBOL	NAME
AaB	Aaron silt loam, 2 to 8 percent slopes
AaC2	Aaron silt loam, 8 to 15 percent slopes, eroded
AaD2	Aaron silt loam, 15 to 25 percent slopes, eroded
AcB	Aaron-Upshur complex, 2 to 6 percent slopes
AfB	Alford silt loam, 2 to 8 percent slopes
AfC2	Alford silt loam, 8 to 15 percent slopes, eroded
BeB	Berks channery silt loam, 2 to 8 percent slopes
BeD2	Berks channery silt loam, 15 to 25 percent slopes, eroded
BeE	Berks channery silt loam, 25 to 40 percent slopes
BkF	Berks-Westmoreland complex, 40 to 70 percent slopes
BoB	Bethesda shaly silt loam, 1 to 15 percent slopes
BoD	Bethesda shaly silt loam, 15 to 25 percent slopes
BpF	Bethesda flaggy silt loam, 25 to 70 percent slopes
BsC2	Brookside silty clay loam, 8 to 15 percent slopes, eroded
BsE	Brookside silty clay loam, 15 to 40 percent slopes
Cb	Chagrin loam, rarely flooded
CcA	Chavies loam, 0 to 2 percent slopes
CcB	Chavies loam, 2 to 6 percent slopes
CeA	Chili loam, 0 to 3 percent slopes
CeB	Chili loam, 3 to 8 percent slopes
ChA	Chili gravelly loam, 0 to 3 percent slopes
ChB	Chili gravelly loam, 3 to 8 percent slopes
ChC	Chili gravelly loam, 8 to 15 percent slopes
CkA	Cidermill silt loam, 0 to 3 percent slopes
CnB	Cincinnati silt loam, 2 to 6 percent slopes
CnC2	Cincinnati silt loam, 6 to 15 percent slopes, eroded
CpC2	Clarksburg silt loam, 8 to 15 percent slopes, eroded
CrC	Claysville-Guernsey silty clay loams, 8 to 15 percent slopes
CsC2	Coshocton silt loam, 8 to 15 percent slopes, eroded
CsD	Coshocton silt loam, 15 to 25 percent slopes
CtE	Coshocton-Westmoreland silt loams, 25 to 40 percent slopes
Ds	Dumps and Pits, mine
FaB	Fairpoint silty clay loam, 1 to 15 percent slopes
FaD	Fairpoint silty clay loam, 15 to 25 percent slopes
FaE	Fairpoint silty clay loam, 25 to 50 percent slopes
FbF	Fairpoint channery silty clay loam, 25 to 70 percent slopes
FcA	Fitchville silt loam, 0 to 2 percent slopes
FcB	Fitchville silt loam, 2 to 6 percent slopes
FkB	Frankstown Variant-Mertz complex, 3 to 8 percent slopes
GdB	Gilpin silt loam, 2 to 8 percent slopes
GdC2	Gilpin silt loam, 8 to 15 percent slopes, eroded
GeD2	Gilpin-Upshur complex, 15 to 25 percent slopes, eroded
GeE2	Gilpin-Upshur complex, 25 to 40 percent slopes, eroded
GfA	Glenford silt loam, 0 to 2 percent slopes
GfB	Glenford silt loam, 2 to 6 percent slopes
GfC2	Glenford silt loam, 6 to 15 percent slopes, eroded
GtC2	Guernsey-Upshur silty clay loams, 6 to 15 percent slopes, eroded
GtD2	Guernsey-Upshur silty clay loams, 15 to 25 percent slopes, eroded
HaC2	Homewood silt loam, 8 to 15 percent slopes, eroded
HaD2	Homewood silt loam, 15 to 20 percent slopes, eroded
JtA	Jimtown loam, 0 to 3 percent slopes
KeB	Keene silt loam, 2 to 6 percent slopes
KeC2	Keene silt loam, 6 to 15 percent slopes, eroded
Km	Killbuck silt loam, occasionally flooded
LaC	Lakin loamy fine sand, 8 to 15 percent slopes
LcD	Lakin-Alford complex, 15 to 25 percent slopes
Lk	Lindside silt loam, occasionally flooded
Lm	Lobdell loam, channery substratum, occasionally flooded
Lo	Lorain silty clay
LpC2	Lowell silt loam, 8 to 15 percent slopes, eroded
LpD2	Lowell silt loam, 15 to 25 percent slopes, eroded
LrE2	Lowell-Gilpin complex, 25 to 40 percent slopes, eroded
LrF	Lowell-Gilpin complex, 40 to 70 percent slopes
Lu	Luray silty clay loam

SYMBOL	NAME
MaB	Markland silt loam, 2 to 6 percent slopes
MbC2	Markland silty clay loam, 6 to 15 percent slopes, eroded
McD2	Markland-Glenford complex, 15 to 35 percent slopes, eroded
MdA	McGary silt loam, 0 to 3 percent slopes
Me	Melvin silt loam, frequently flooded
MkD	Mertz very cherty silt loam, 15 to 35 percent slopes
MrB	Morristown shaly silty clay loam, 1 to 15 percent slopes
MrD	Morristown shaly silty clay loam, 15 to 25 percent slopes
MrF	Morristown shaly silty clay loam, 25 to 70 percent slopes
MsB	Morristown silty clay loam, 1 to 8 percent slopes
MsC	Morristown silty clay loam, 8 to 15 percent slopes
MsD	Morristown silty clay loam, 15 to 25 percent slopes
MsE	Morristown silty clay loam, 25 to 50 percent slopes
Ne	Newark silt loam, frequently flooded
No	Nolin silt loam, occasionally flooded
OmB	Omulga silt loam, 2 to 6 percent slopes
OmC	Omulga silt loam, 6 to 15 percent slopes
RaB	Rawson silt loam, 2 to 6 percent slopes
RfC	Rigley loam, 8 to 15 percent slopes
RgD	Rigley channery loam, 15 to 25 percent slopes
RhE	Rigley-Coshocton complex, 25 to 40 percent slopes
RoF	Rodman gravelly sandy loam, 25 to 70 percent slopes
Se	Sebring silt loam
St	Stonelick loam, occasionally flooded
Ta	Tioga fine sandy loam, rarely flooded
Tf	Tioga fine sandy loam, occasionally flooded
Ud	Udorthents, loamy, hilly
Ug	Udorthents, sandy, rolling
Uh	Udorthents, sandy-skeletal, steep
Uk	Udorthents-Pits complex
UsB	Urban land-Glenford complex, 2 to 8 percent slopes
UtA	Urban land-Nolin complex, rarely flooded
UvB	Urban land-Watertown complex, 1 to 15 percent slopes
UwC	Urban land-Wellston complex, 5 to 15 percent slopes
WaB	Watertown sandy loam, 1 to 8 percent slopes
WaC	Watertown sandy loam, 8 to 15 percent slopes
WhB	Wellston silt loam, 2 to 8 percent slopes
WhC2	Wellston silt loam, 8 to 15 percent slopes, eroded
WmB	Westgate silt loam, 2 to 6 percent slopes
WmC2	Westgate silt loam, 6 to 15 percent slopes, eroded
WtC2	Westmoreland silt loam, 8 to 15 percent slopes, eroded
WtD2	Westmoreland silt loam, 15 to 25 percent slopes, eroded
WtE	Westmoreland silt loam, 25 to 40 percent slopes
WuC2	Westmoreland-Guernsey silt loams, 8 to 15 percent slopes, eroded
WuD2	Westmoreland-Guernsey silt loams, 15 to 25 percent slopes, eroded
WuE2	Westmoreland-Guernsey silt loams, 25 to 40 percent slopes, eroded
WvD	Westmoreland-Urban land complex, 15 to 35 percent slopes
ZnB	Zanesville silt loam, 2 to 6 percent slopes
ZnC2	Zanesville silt loam, 6 to 15 percent slopes, eroded

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES



BOUNDARIES

County or parish

Minor civil division

Field sheet matchline & neatline

AD HOC BOUNDARY (label)

Small airport, airfield, park, oilfield, cemetery, or flood pool

STATE COORDINATE TICK

ROADS

Divided (median shown if scale permits)

Other roads

ROAD EMBLEMS & DESIGNATIONS

Interstate

Federal

State

County

RAILROAD

DAMS

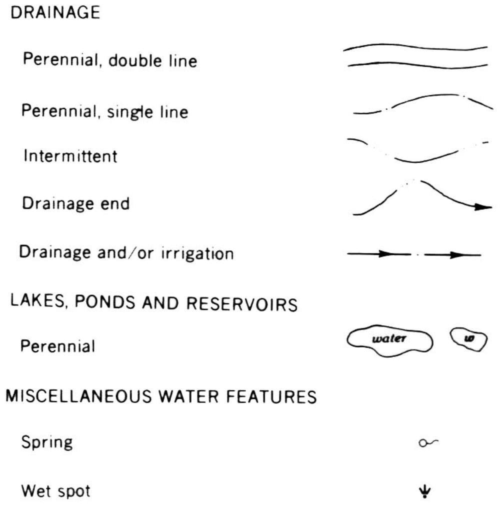
Large (to scale)

Medium or small

PITS

Mine or quarry

WATER FEATURES



DRAINAGE

Perennial, double line

Perennial, single line

Intermittent

Drainage end

Drainage and/or irrigation

LAKES, PONDS AND RESERVOIRS

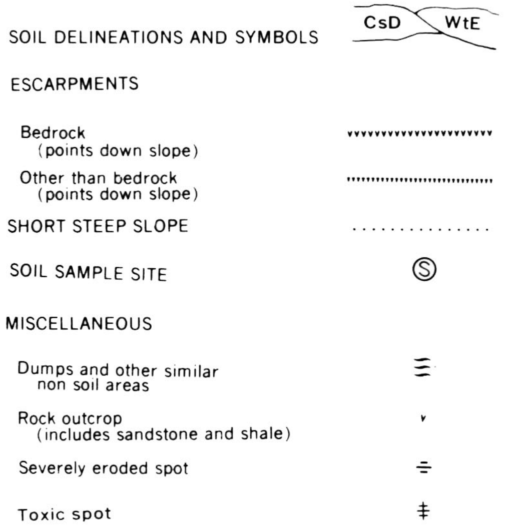
Perennial

MISCELLANEOUS WATER FEATURES

Spring

Wet spot

SPECIAL SYMBOLS FOR SOIL SURVEY



SOIL DELINEATIONS AND SYMBOLS

ESCARPMENTS

Bedrock
(points down slope)

Other than bedrock
(points down slope)

SHORT STEEP SLOPE

SOIL SAMPLE SITE

MISCELLANEOUS

Dumps and other similar non soil areas

Rock outcrop
(includes sandstone and shale)

Severely eroded spot

Toxic spot

MUSKINGUM COUNTY, OHIO — SHEET NUMBER 1

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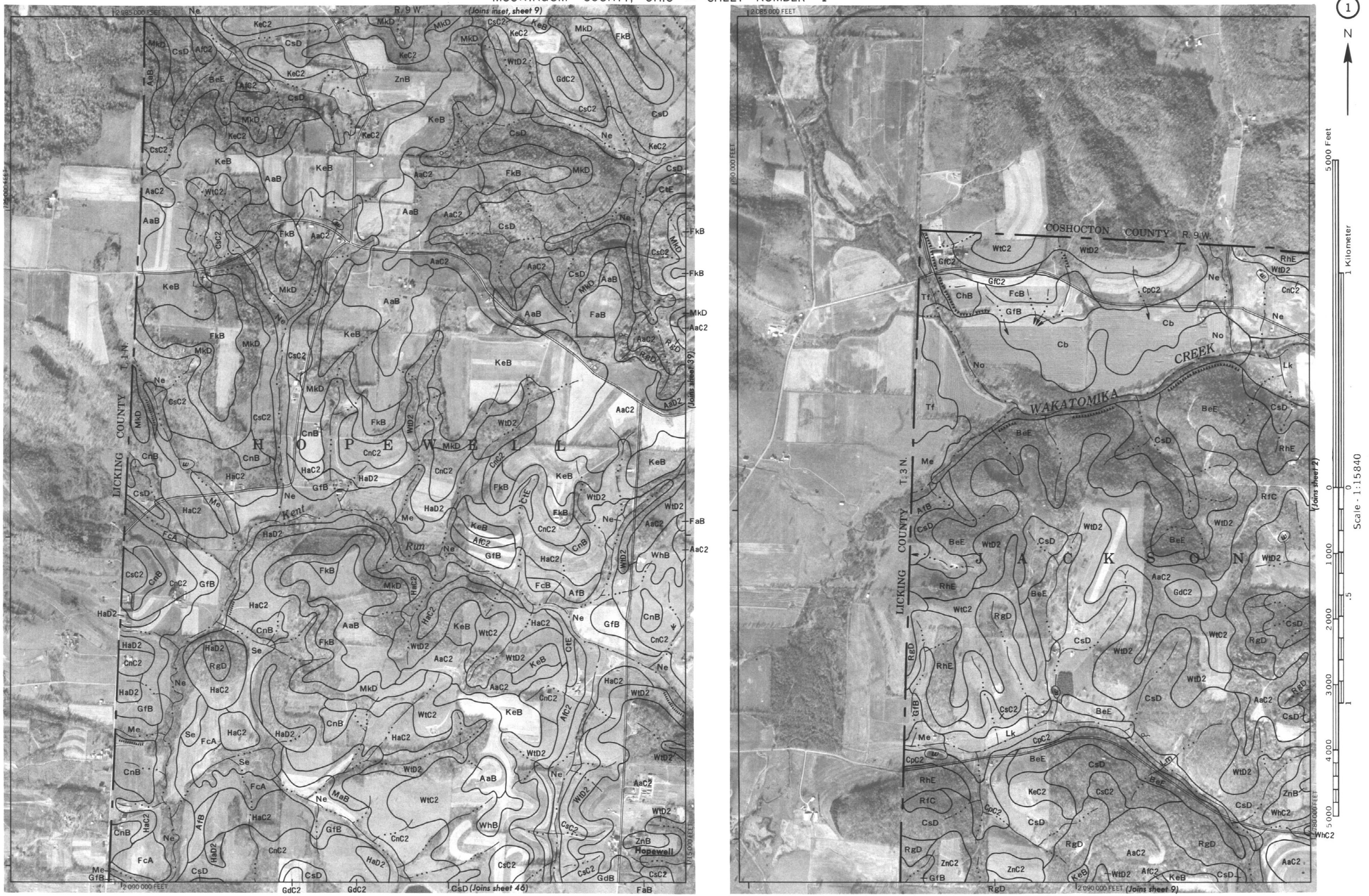
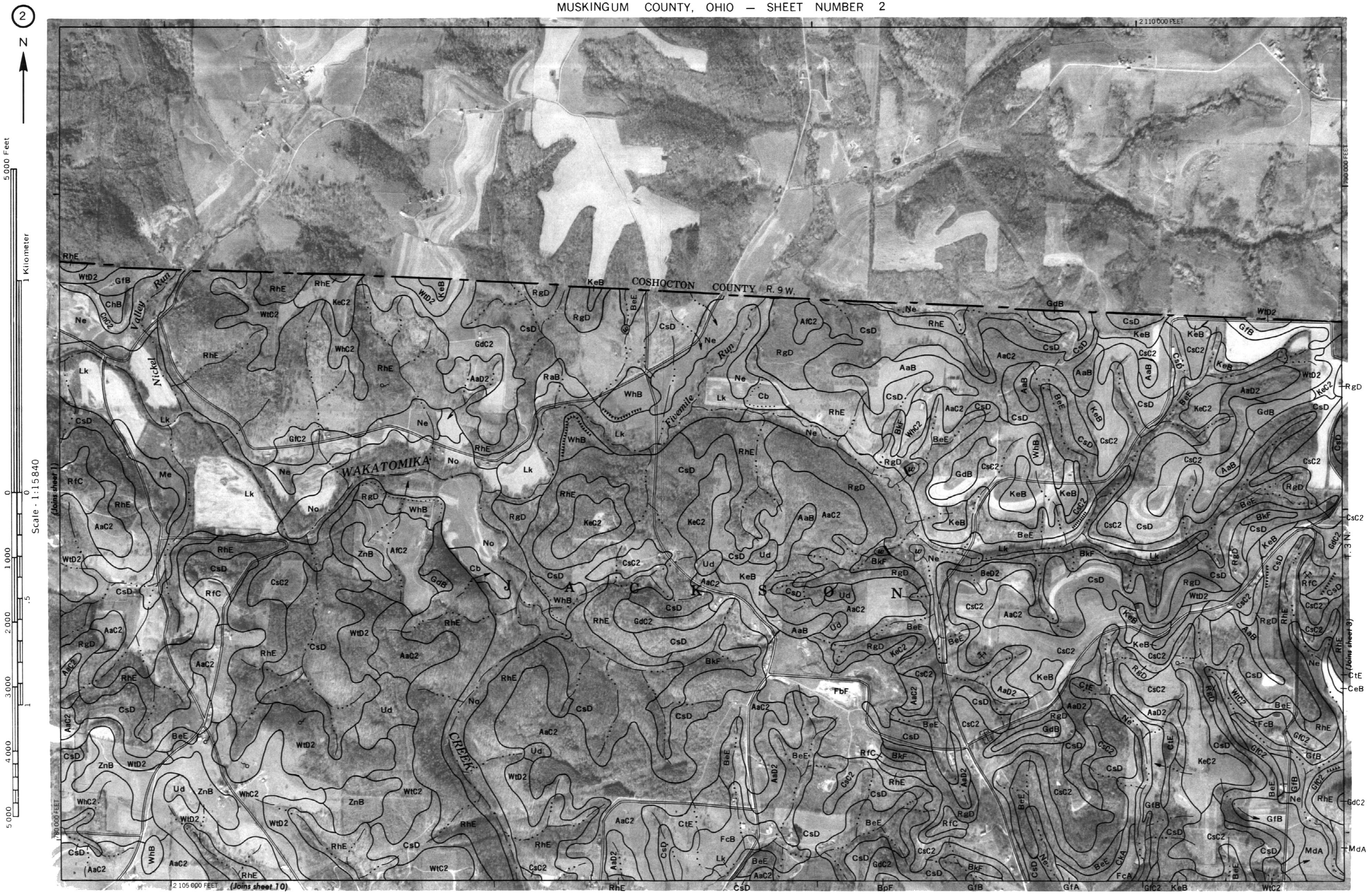
MUSKINGUM COUNTY, OHIO NO. 1


(Joins inset, sheet 9)
R. 9 W.
2 085 000 FEET
LICKING COUNTY
T. 1 N.
H O P E W E L L
Kent Run
Hopewell
(Joins sheet 39)
CsD (Joins sheet 46)
2 090 000 FEET
COSHOCTON COUNTY R. 9 W.
WAKATOMIKA CREEK
J A C K S O N
T. 3 N.
(Joins sheet 2)
2 090 000 FEET (Joins sheet 9)
N
5 000 Feet
1 Kilometer
Scale - 1:15 840
0
1000
2000
3000
4000
5000
.5
1
KeC2
CsD
AfC2
MkD
BeE
ZnB
KeB
AaB
AaC2
WtC2
FkB
CsC2
WtD2
GdC2
CtE
FaB
RgD
Ne
Me
CnB
CnC2
HaC2
HaD2
GfB
FcA
Se
MaB
WhB
CsC2
GdB
Cb
No
Tf
ChB
FcB
GfC2
CpC2
Lk
RhE
RfC
ZnC2
WhC2
KeC2
ZnB

MUSKINGUM COUNTY, OHIO — SHEET NUMBER 2



2
N
5 000 Feet
1 Kilometer
Scale - 1:15 840
0
1 000
2 000
3 000
4 000
5 000
.5
1
2 110 000 FEET
780 000 FEET
2 105 000 FEET
COSHOCTON COUNTY
R. 9 W.
T. 3 N.
J A C K S O N
WAKATOMIKA
CREEK
Nickel Run
Valley Run
Fivemile Run
(Joins sheet 1)
(Joins sheet 3)
(Joins sheet 10)
RgD
CsC2
CtE
CeB
GdC2
MdA
RhE
CsD
BpF
GfB
GfA
GfC2
KeB
WtC2
FbF

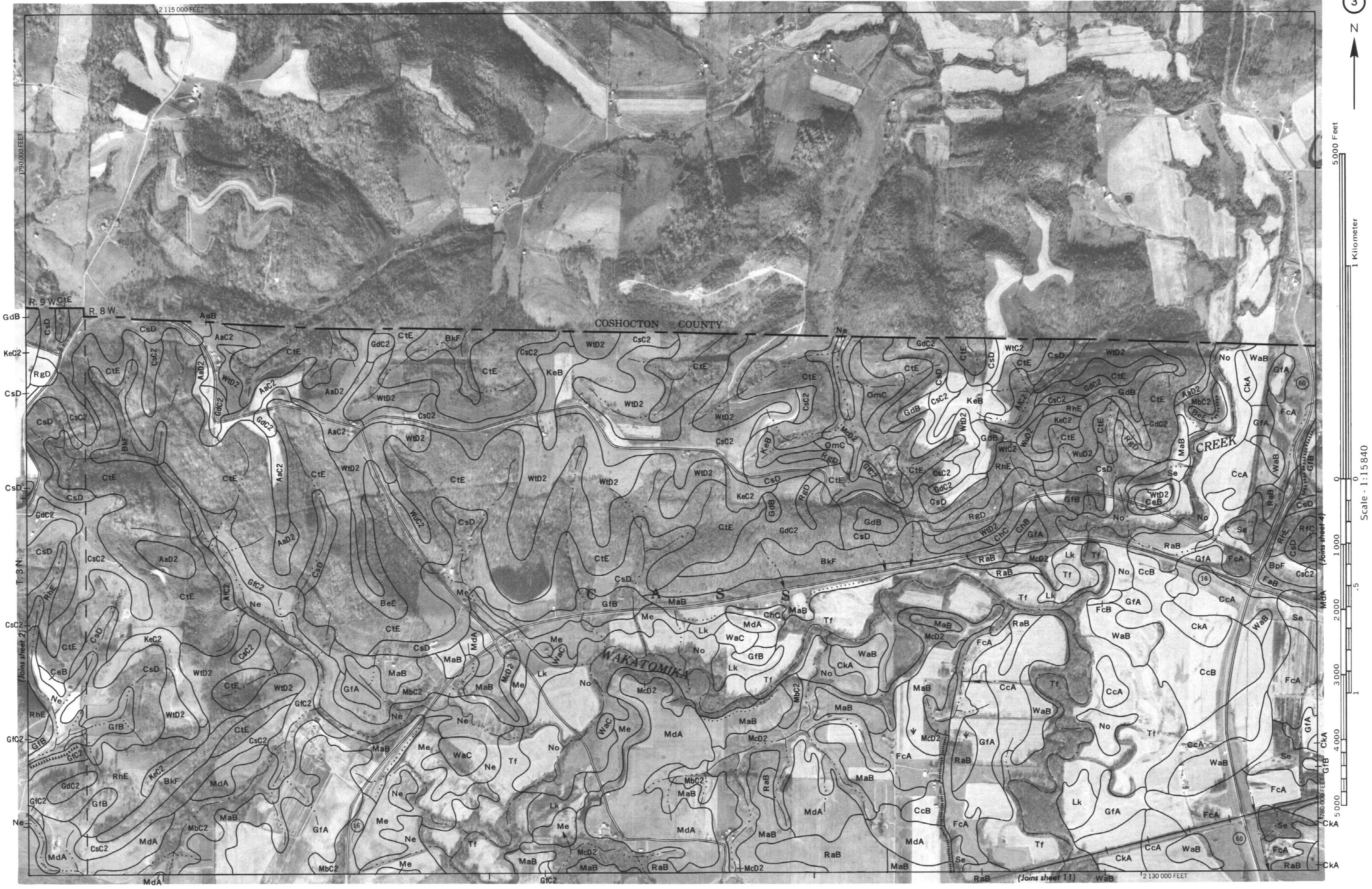
MUSKINGUM COUNTY, OHIO NO. 2

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MUSKINGUM COUNTY, OHIO — SHEET NUMBER 3

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

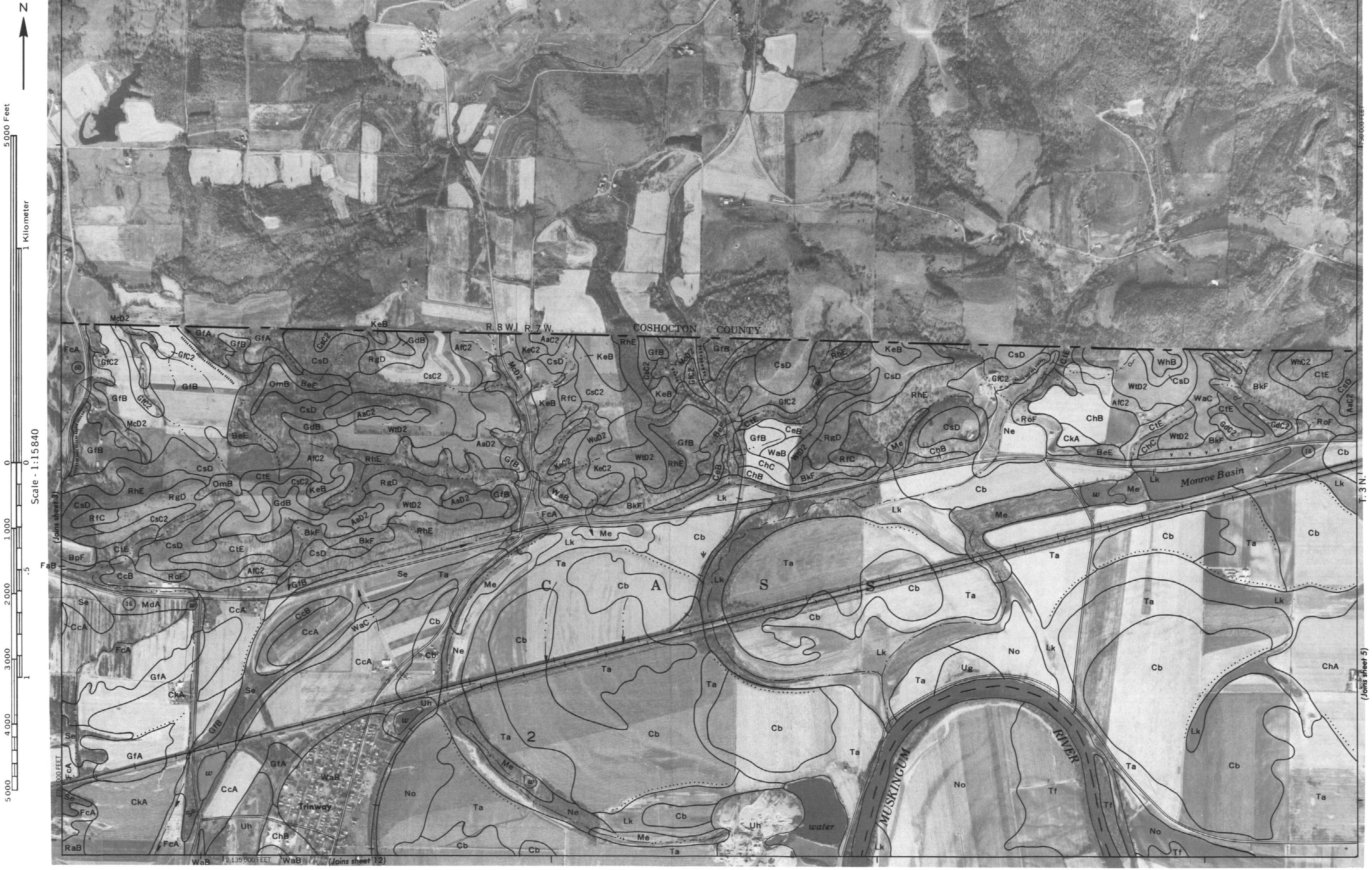
MUSKINGUM COUNTY, OHIO NO. 3



③
N
2 115 000 FEET
1 750 000 FEET
2 130 000 FEET
1 780 000 FEET
R. 9 W.
R. 8 W.
T. 3 N.
COSHOCTON COUNTY
CASS
WAKATOMIKA
CREEK
(Joins sheet 2)
(Joins sheet 4)
(Joins sheet 11)
16
60
GdB
KeC2
CsD
CsC2
GfC2
Ne
CkA
MdA
MbC2
GfC2
RaB
WaB
5000 Feet
1 Kilometer
Scale - 1:15840
0
1000
2000
3000
4000
5000
0
.5
1

④

MUSKINGUM COUNTY, OHIO — SHEET NUMBER 4


N
5 000 Feet
1 Kilometer
Scale - 1:15840
0
1 000
2 000
3 000
4 000
5 000
.5
1
2 150 000 FEET
2 135 000 FEET
750 000 FEET
730 000 FEET
R. 8 W. | R. 7 W.
COSHOCTON COUNTY
T. 3 N.
(Joins sheet 3)
(Joins sheet 5)
(Joins sheet 12)
Monroe Basin
MUSKINGUM RIVER
Trinway
water
w
C A S S
2
16
60
McD2
FcA
GfC2
GfA
GfB
GfC2
KeB
CsC2
GdB
RgD
AfC2
AaC2
KeC2
McD2
CsD
KeB
RfC
CsC2
RhE
CtE
WhB
WhC2
WtD2
WaC
BkF
GdC2
RoF
CsD
OmB
BeE
WtD2
AaD2
CsD
GdB
AfC2
RhE
WuD2
KeC2
WtD2
CeB
WaB
ChC
ChB
BkF
RfC
Me
CsD
ChB
Ne
RoF
CkA
ChB
BeE
GfC2
Lk
Cb
RhE
CsD
RgD
OmB
CtE
CsC2
KeB
AaD2
BkF
WaB
FcA
CsD
RfC
CsC2
BpF
CcB
RoF
AfC2
GfB
FaB
Se
Ta
Me
Lk
Me
Cb
Ta
MdA
CcA
CcB
CcA
WaC
Cb
Ne
Cb
CcA
FcA
GfA
CkA
Se
Uh
Ta
Cb
Ug
No
Ta
Cb
ChA
GfA
Se
GfB
FcA
CkA
CcA
GfA
WaB
ChB
Uh
RaB
WaB
No
Ta
Me
Ne
Lk
Me
Cb
Uh
Tf
No
Tf

MUSKINGUM COUNTY, OHIO NO. 4

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MUSKINGUM COUNTY, OHIO — SHEET NUMBER 5

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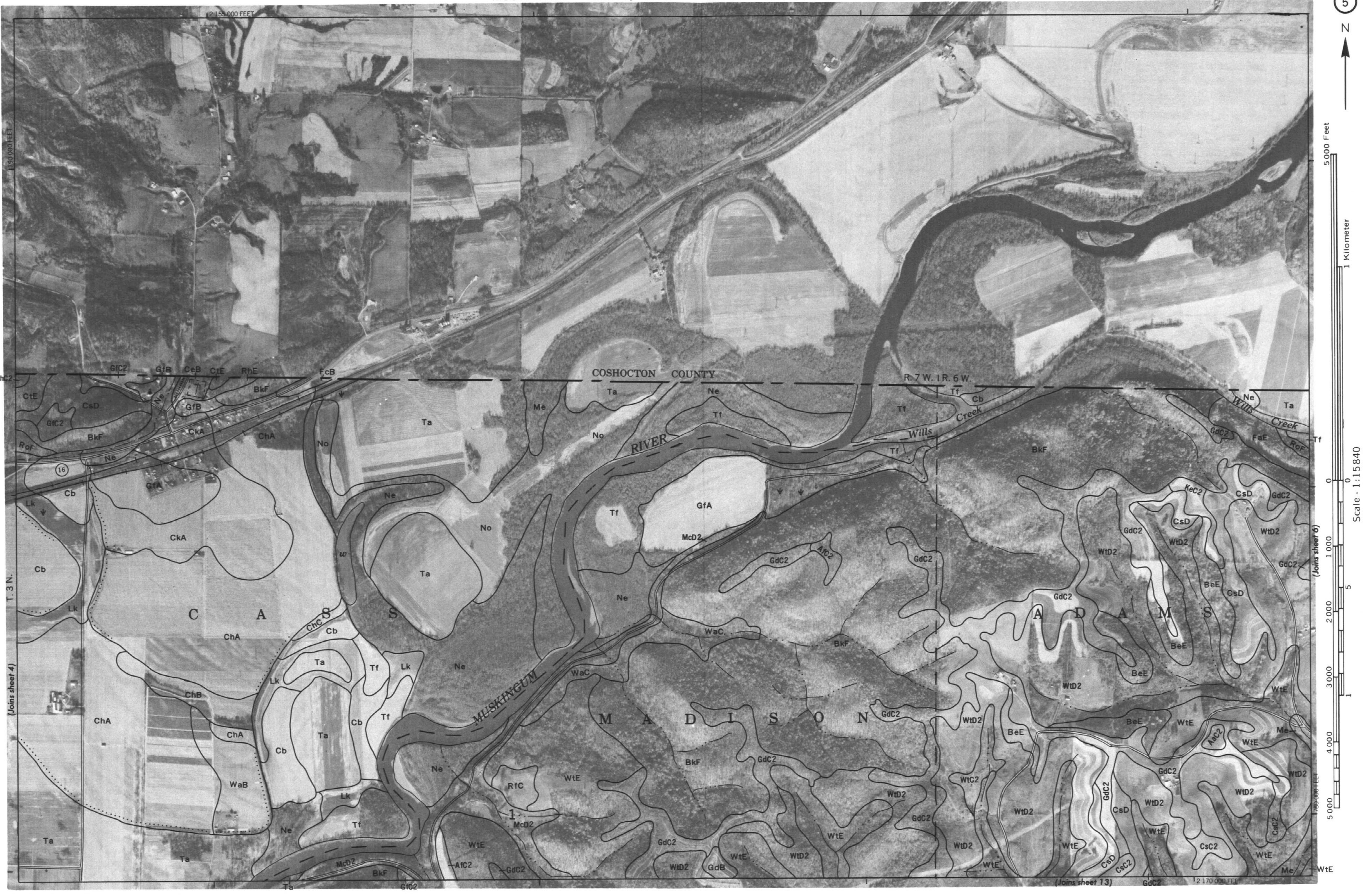
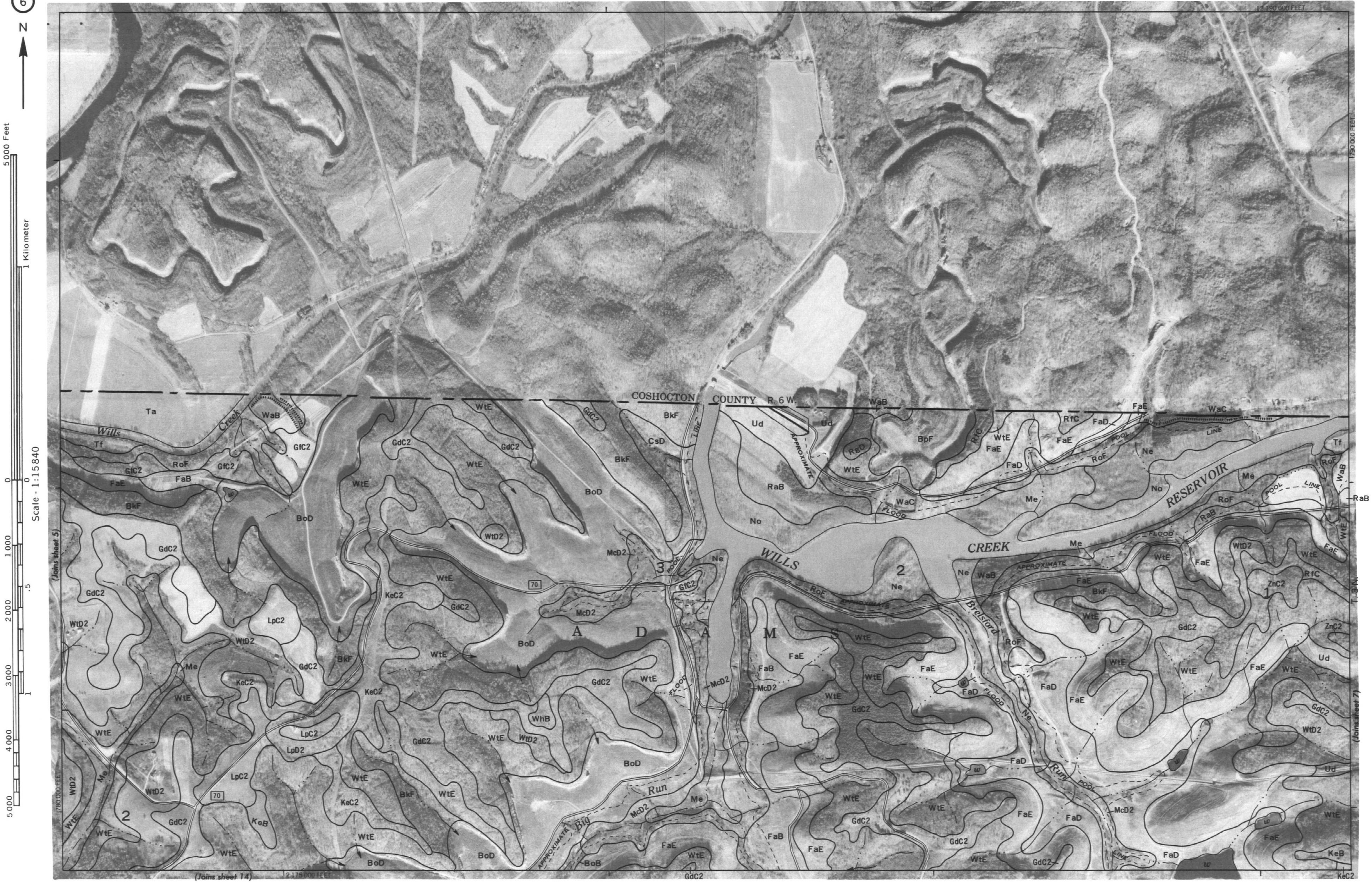
MUSKINGUM COUNTY, OHIO NO. 5



5
N
2 155 000 FEET
790 000 FEET
COSHOCTON COUNTY
R. 7 W. | R. 6 W.
T. 3 N.
C A S S
M A D I S O N
A D A M S
MUSKINGUM
RIVER
Wills Creek
16
(Joins sheet 4)
(Joins sheet 6)
(Joins sheet 13)
2 170 000 FEET
760 000 FEET
WhC2
GfC2
GfB
CeB
CtE
RhE
FcB
CtE
CsD
GfC2
BkF
RoF
GfB
CkA
Ne
ChA
Ne
GfA
Lk
Cb
CkA
Cb
Lk
ChA
ChB
ChA
ChA
WaB
Ta
Ta
No
Ta
Ne
w
Ta
No
ChC
Cb
Ta
Tf
Lk
Lk
Ta
Cb
Tf
Cb
Lk
Ne
Tf
Ne
Ne
Me
Ta
No
Ne
Tf
Tf
GfA
McD2
Ne
WaC
WaC
GdC2
AfC2
GdC2
BkF
BkF
RfC
WtE
McD2
WtE
AfC2
GdC2
McD2
BkF
GfC2
Ta
GdC2
WtD2
GdB
WtE
WtE
WtD2
WtD2
GdC2
GdC2
Tf
Cb
Tf
Tf
Ne
Ta
GdC2
FeE
RoF
Tf
BkF
KeC2
CsD
GdC2
CsD
GdC2
WtD2
WtD2
WtD2
GdC2
GdC2
BeE
CsD
BeE
WtD2
BeE
BeE
WtE
BeE
WtE
BeE
WtE
AfC2
WtE
Me
WtD2
WtC2
GdC2
GdC2
CsD
WtD2
WtD2
WtD2
WtD2
WtD2
WtE
WtE
CsD
CsC2
CsC2
CsC2
WtE
WtE
Me
WtE
GdC2
5 000 Feet
1 Kilometer
0
1 000
2 000
3 000
4 000
5 000
0
5
1
Scale - 1:15840


⑥
N
5 000 Feet
1 Kilometer
Scale - 1:15 840
0
1000
2000
3000
4000
5000
.5
1
2 190 000 FEET
1 790 000 FEET
1 780 000 FEET
2 175 000 FEET
(Joins sheet 5)
(Joins sheet 7)
(Joins sheet 14)
COSHOCTON COUNTY
R. 6 W.
R. 7 W.
LINE
APPROXIMATE
WILLS CREEK RESERVOIR
Wills Creek
A D A M S
Big Run
Brelsford Run
POOL LINE
FLOOD
70
1
2
3
Ta
Tf
WaB
GfC2
RoF
FaB
FaE
BkF
GdC2
BoD
WtE
WtD2
McD2
CsD
BkF
Ud
RaB
No
Ne
Me
BpF
RgD
RfC
FaD
WaC
RoE
KeC2
LpC2
LpD2
WhB
ZnC2
KeB
BoB
w

MUSKINGUM COUNTY, OHIO NO. 6

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MUSKINGUM COUNTY, OHIO — SHEET NUMBER 7

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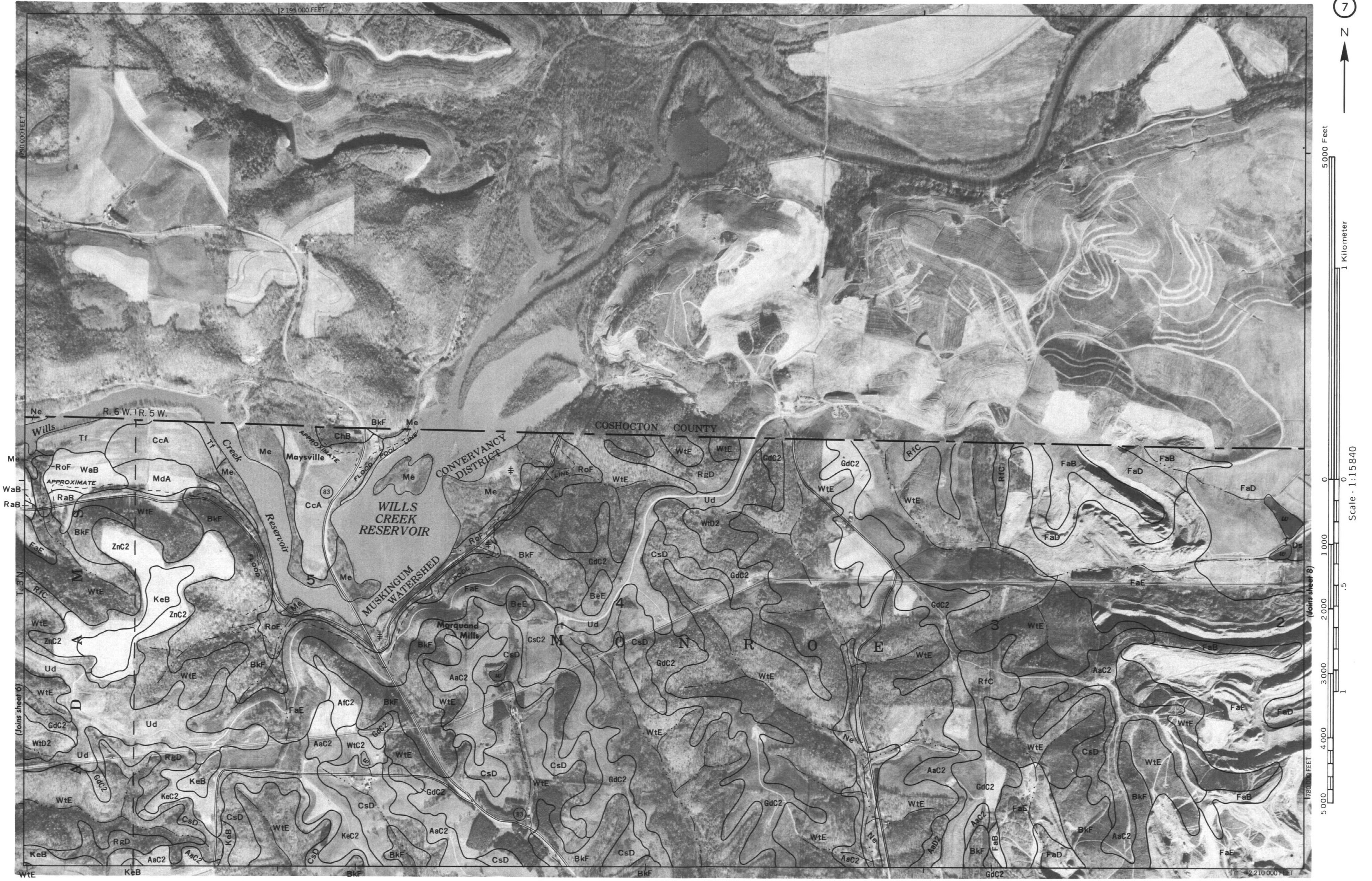
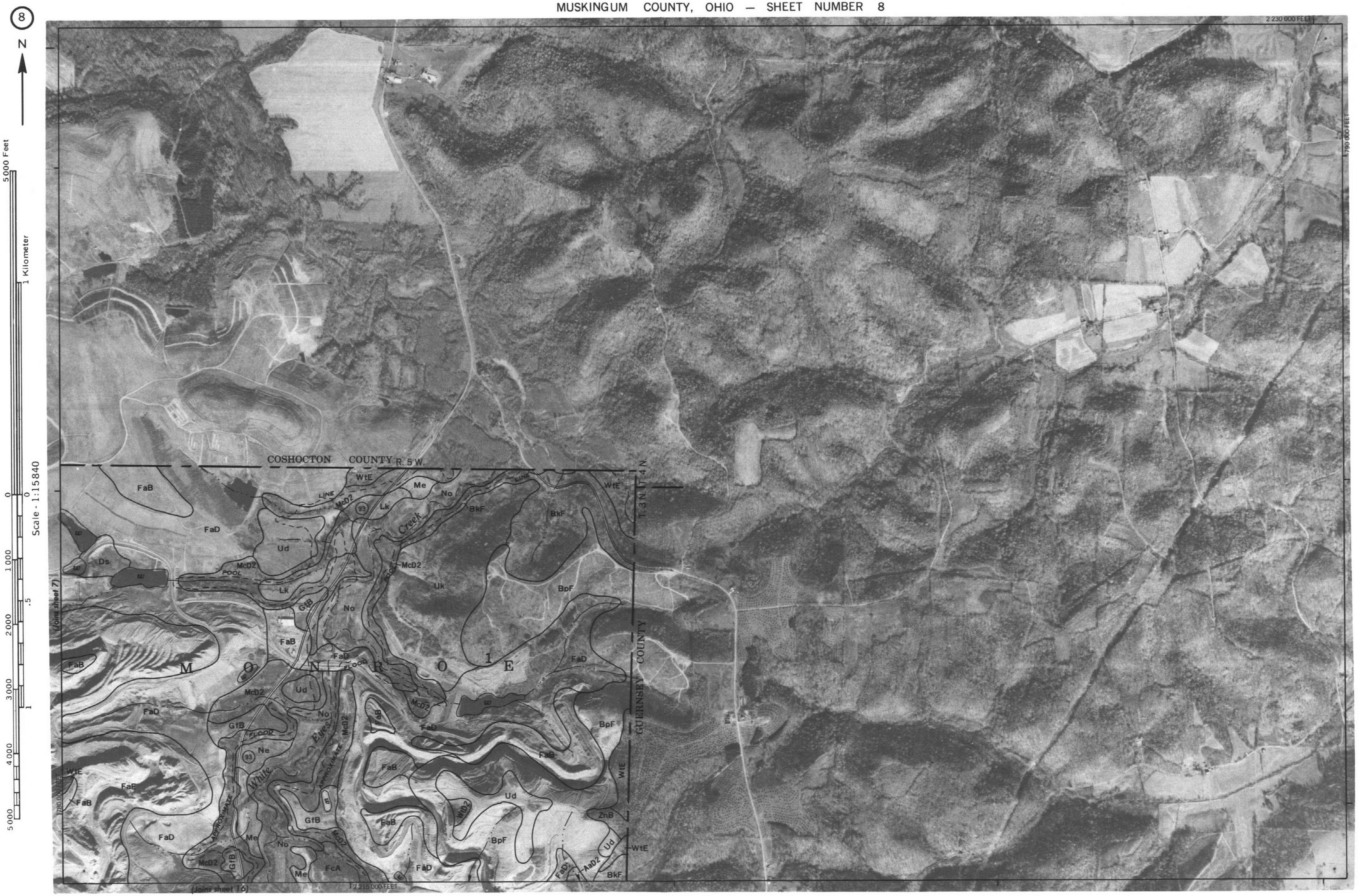
MUSKINGUM COUNTY, OHIO NO. 7



7
N
5 000 Feet
1 Kilometer
Scale - 1:15840
0
1000
2000
3000
4000
5000
0
.5
1
2 195 000 FEET
2 210 000 FEET
780 000 FEET
(Joins sheet 6)
(Joins sheet 8)
COSHOCTON COUNTY
R. 6 W. | R. 5 W.
T. 1 N.
MADISON
MONROE
WILLS CREEK RESERVOIR
Wills Creek Reservoir
MUSKINGUM WATERSHED CONSERVANCY DISTRICT
APPROXIMATE FLOOD POOL LINE
Maysville
Marquand Mills
83
2
3
4
5
Ne
Me
Tf
CcA
MdA
RoF
WaB
RaB
BkF
ChB
ZnC2
KeB
WtE
FaE
RfC
Ud
GdC2
WtD2
RgD
KeC2
CsD
AaC2
AfC2
WtC2
FaE
BeE
CsC2
WtE
RgD
GdC2
CsD
FaB
FaD
Ds
RfC
AaD2
GdC2

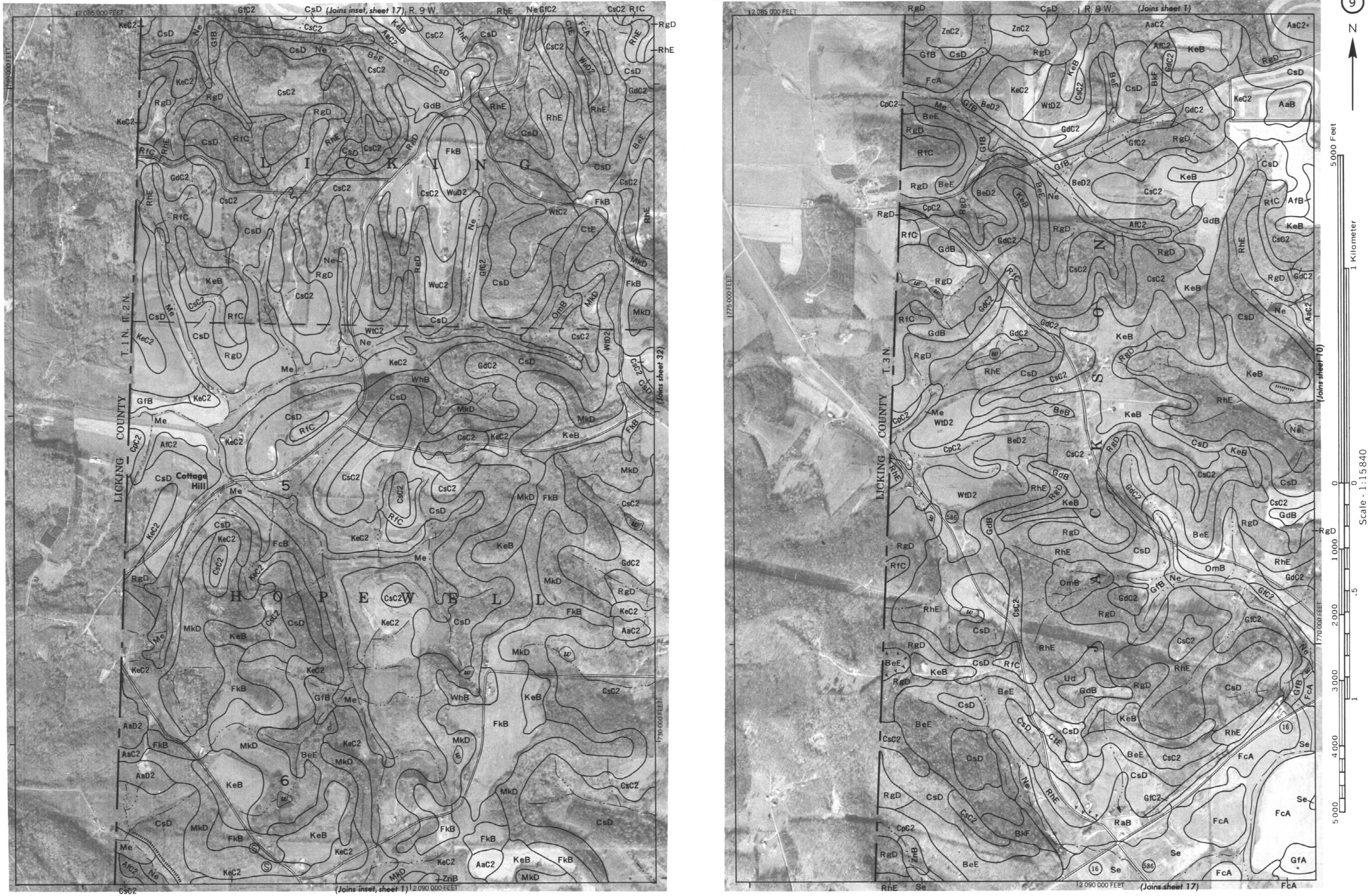
MUSKINGUM COUNTY, OHIO — SHEET NUMBER 8


8
N
5000 Feet
1 Kilometer
Scale - 1:15840
0
1000
2000
3000
4000
5000
0
.5
1
2 230 000 FEET
790 000 FEET
780 000 FEET
2 215 000 FEET
(Joins sheet 7)
(Joins sheet 16)
COSHOCTON COUNTY
R. 5 W.
T. 4 N.
T. 3 N.
GUERNSEY COUNTY
M O N R O E
LINE
POOL
FLOOD
APPROXIMATE
Creek
White Eyes
93
FaB
FaD
FaE
FcA
WtE
WtD2
Me
No
Ne
BkF
Lk
McD2
Ud
Uk
Ds
GfB
BpF
ZnB
AaD2
w
m

MUSKINGUM COUNTY, OHIO NO. 8

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MUSKINGUM COUNTY, OHIO — SHEET NUMBER 9


9
N
(Joins inset, sheet 17)
R. 9 W.
(Joins sheet 1)
(Joins sheet 32)
(Joins sheet 10)
(Joins inset, sheet 1)
(Joins sheet 17)
2 085 000 FEET
2 090 000 FEET
740 000 FEET
730 000 FEET
775 000 FEET
770 000 FEET
LICKING
HOPEWELL
JACKSON
LICKING COUNTY
T. 1 N.
T. 2 N.
T. 3 N.
Cottage Hill
5
6
16
586
5 000 Feet
1 Kilometer
Scale - 1:15840
0
1 000
2 000
3 000
4 000
5 000
.5
1

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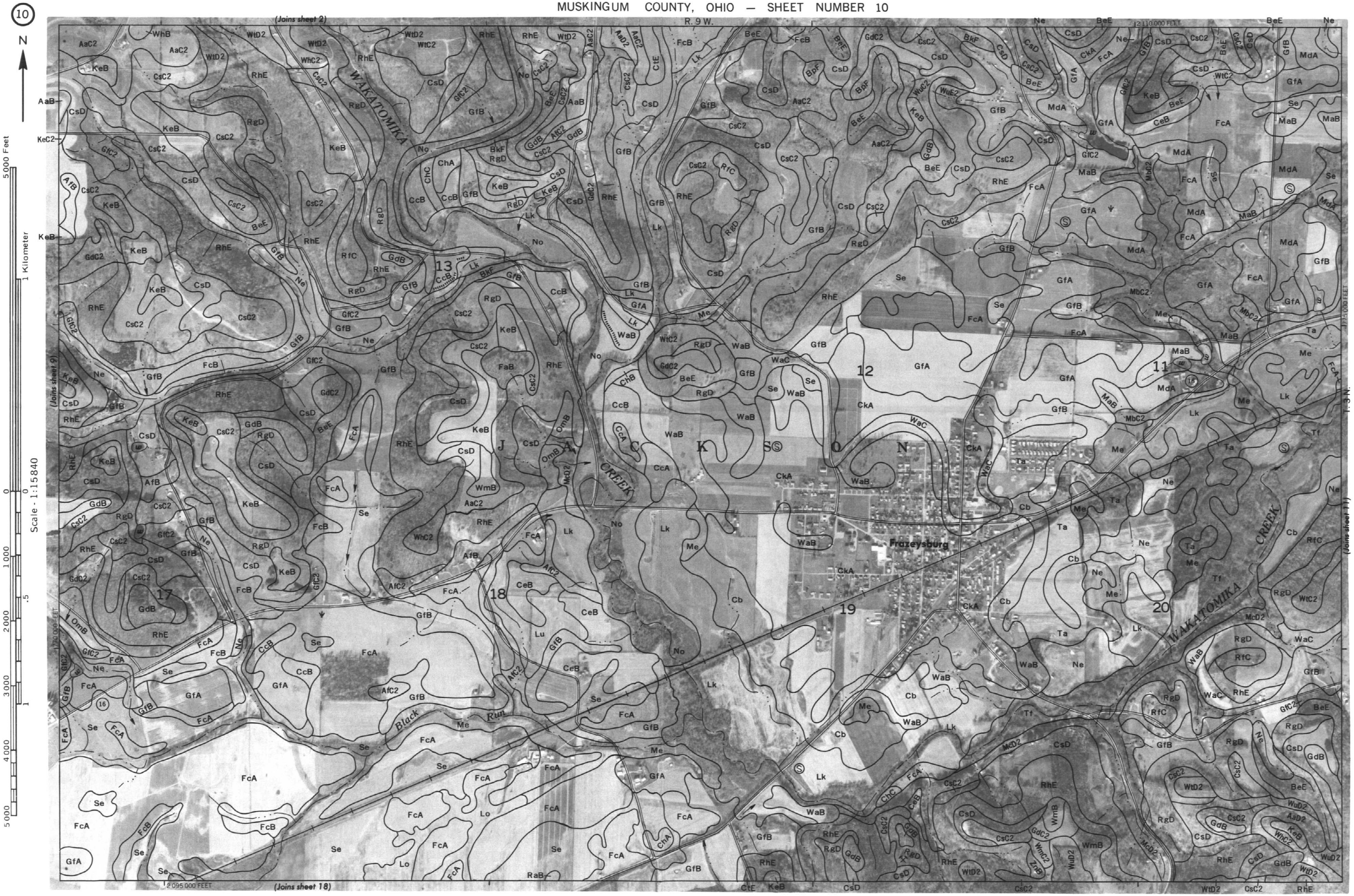
MUSKINGUM COUNTY, OHIO NO. 9

⑩

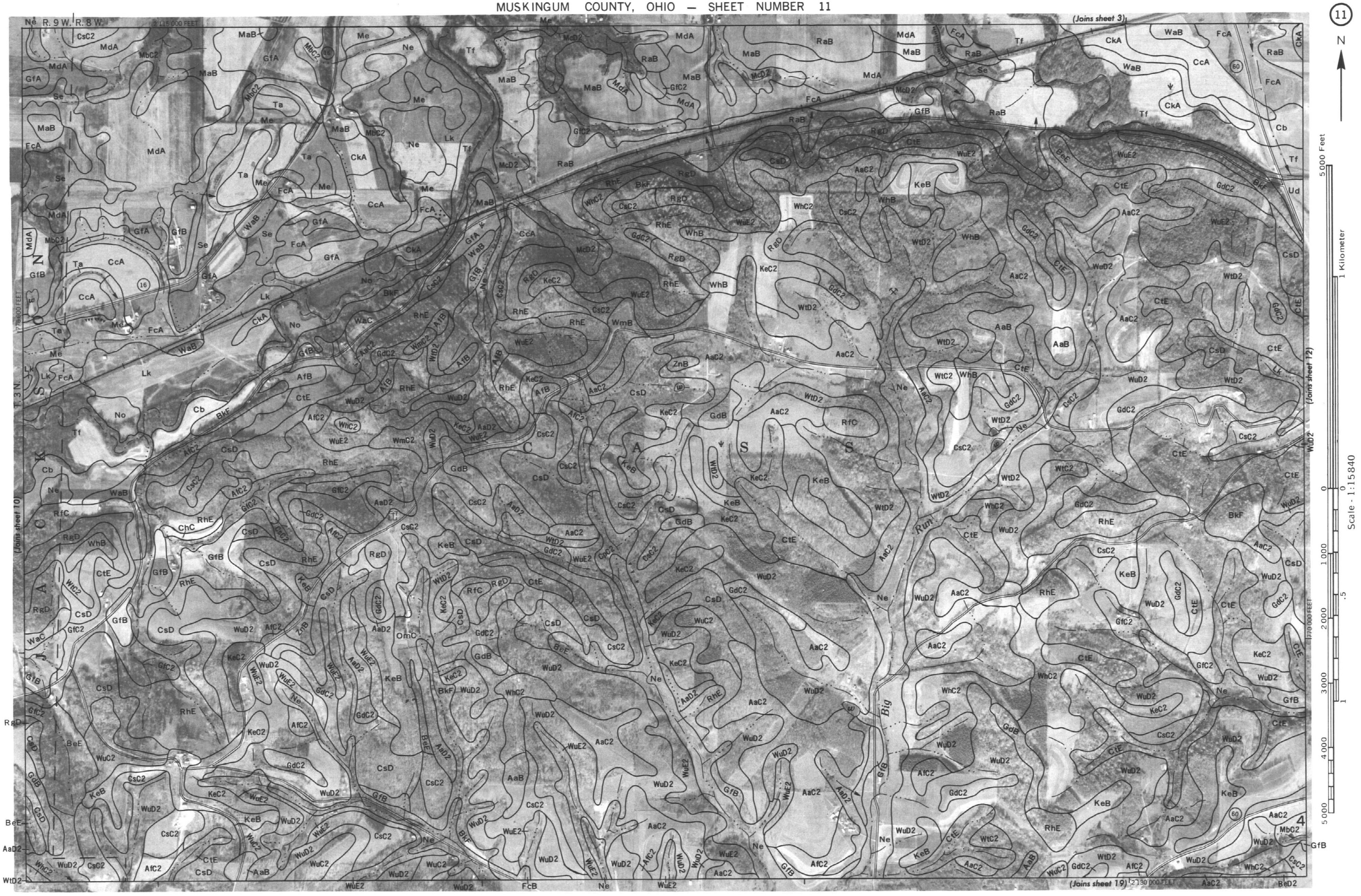
MUSKINGUM COUNTY, OHIO — SHEET NUMBER 10


N
(Joins sheet 2)
(Joins sheet 9)
(Joins sheet 11)
(Joins sheet 18)
R. 9 W.
T. 3 N.
2 110 000 FEET
1 75 000 FEET
1 70 000 FEET
2 095 000 FEET
WAKATOMIKA
WAKATOMIKA
CREEK
CREEK
J A C K S O N
Frazeysburg
Black Run
12
11
13
17
18
19
20
16
5000 Feet
1 Kilometer
Scale - 1:15840
0
1000
2000
3000
4000
5000
0
.5
1

MUSKINGUM COUNTY, OHIO NO. 10

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MUSKINGUM COUNTY, OHIO — SHEET NUMBER 11

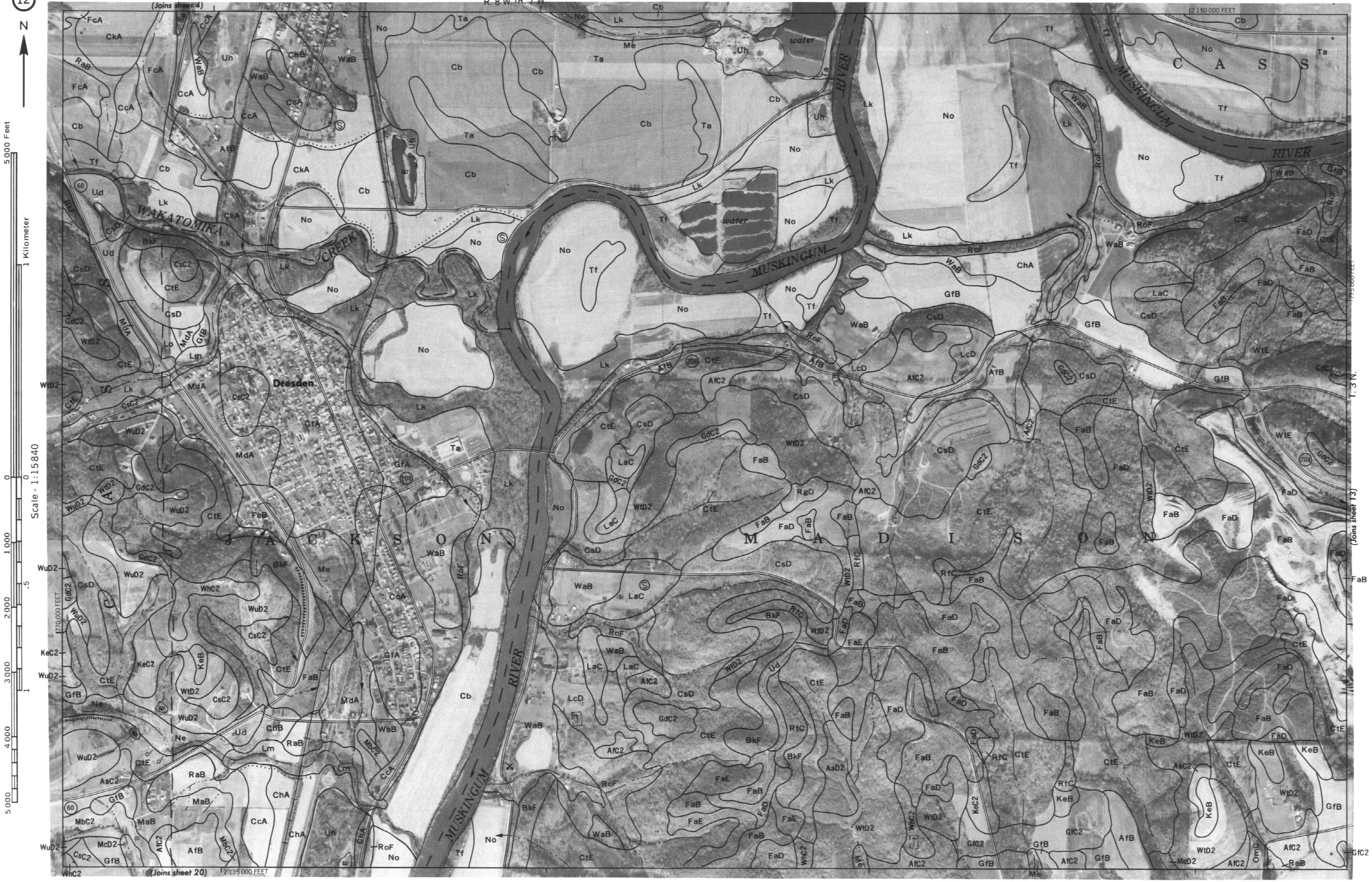

(Joins sheet 3)
(Joins sheet 10)
(Joins sheet 12)
(Joins sheet 19)
R. 9 W. R. 8 W.
T. 3 N.
JACKSON
CASS
Big Run
N
5000 Feet
1 Kilometer
Scale - 1:15840
2 115 000 FEET
2 130 000 FEET
770 000 FEET

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MUSKINGUM COUNTY, OHIO NO. 11

⑫

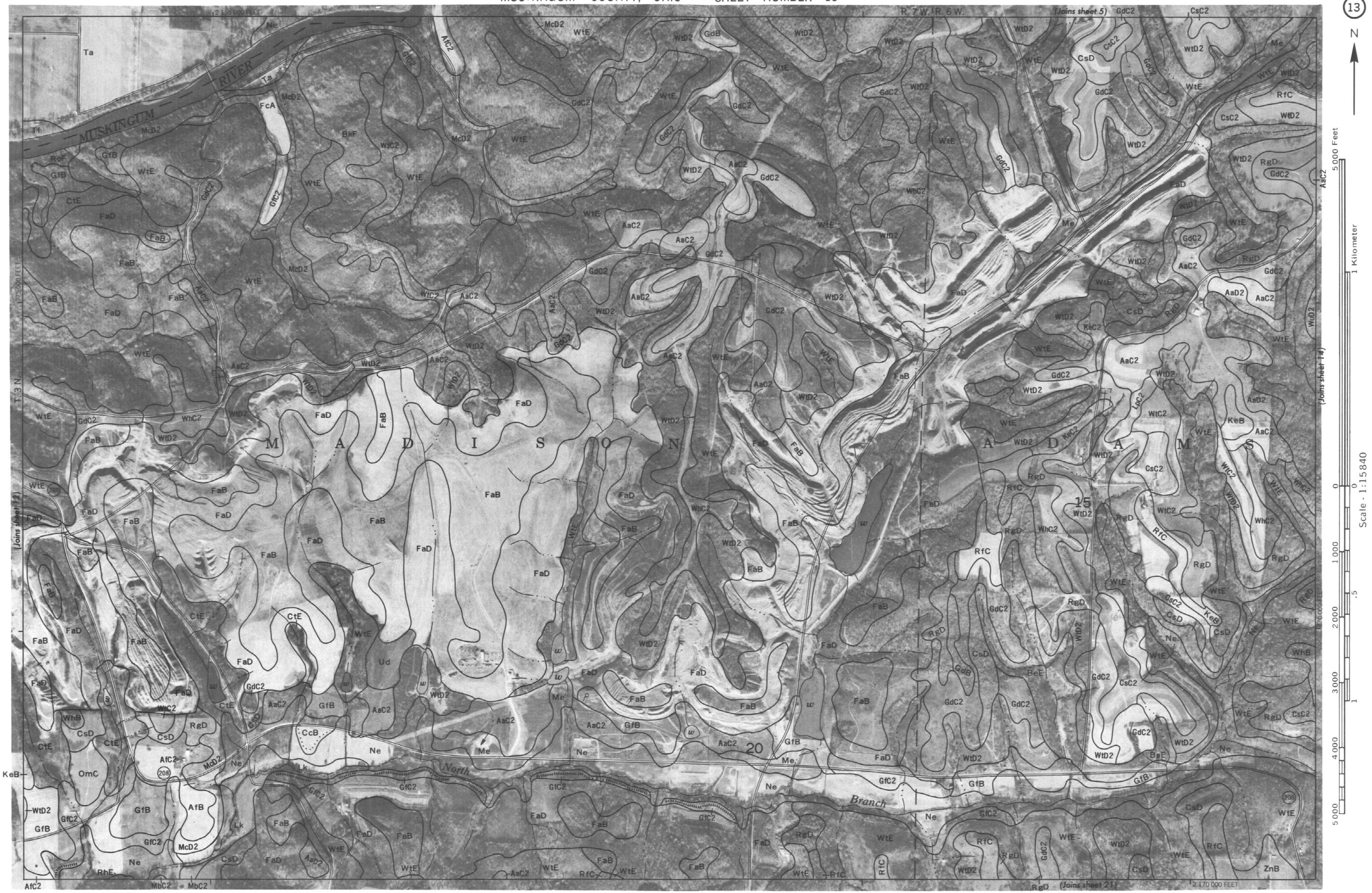
MUSKINGUM COUNTY, OHIO — SHEET NUMBER 12


N
Scale - 1:15 840
5 000 Feet
1 Kilometer
0
1000
2000
3000
4000
5 000
.5
1
(Joins sheet 4)
(Joins sheet 20)
(Joins sheet 13)
R. 8 W.
R. 7 W.
T. 3 N.
2 150 000 FEET
2 135 000 FEET
770 000 FEET
775 000 FEET
Dresden
JACKSON
MADISON
CASS
WAKATOMIKA CREEK
MUSKINGUM RIVER
water
60
208
WuD2
KeC2
GfC2
FaB
WhC2

MUSKINGUM COUNTY, OHIO NO. 12

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

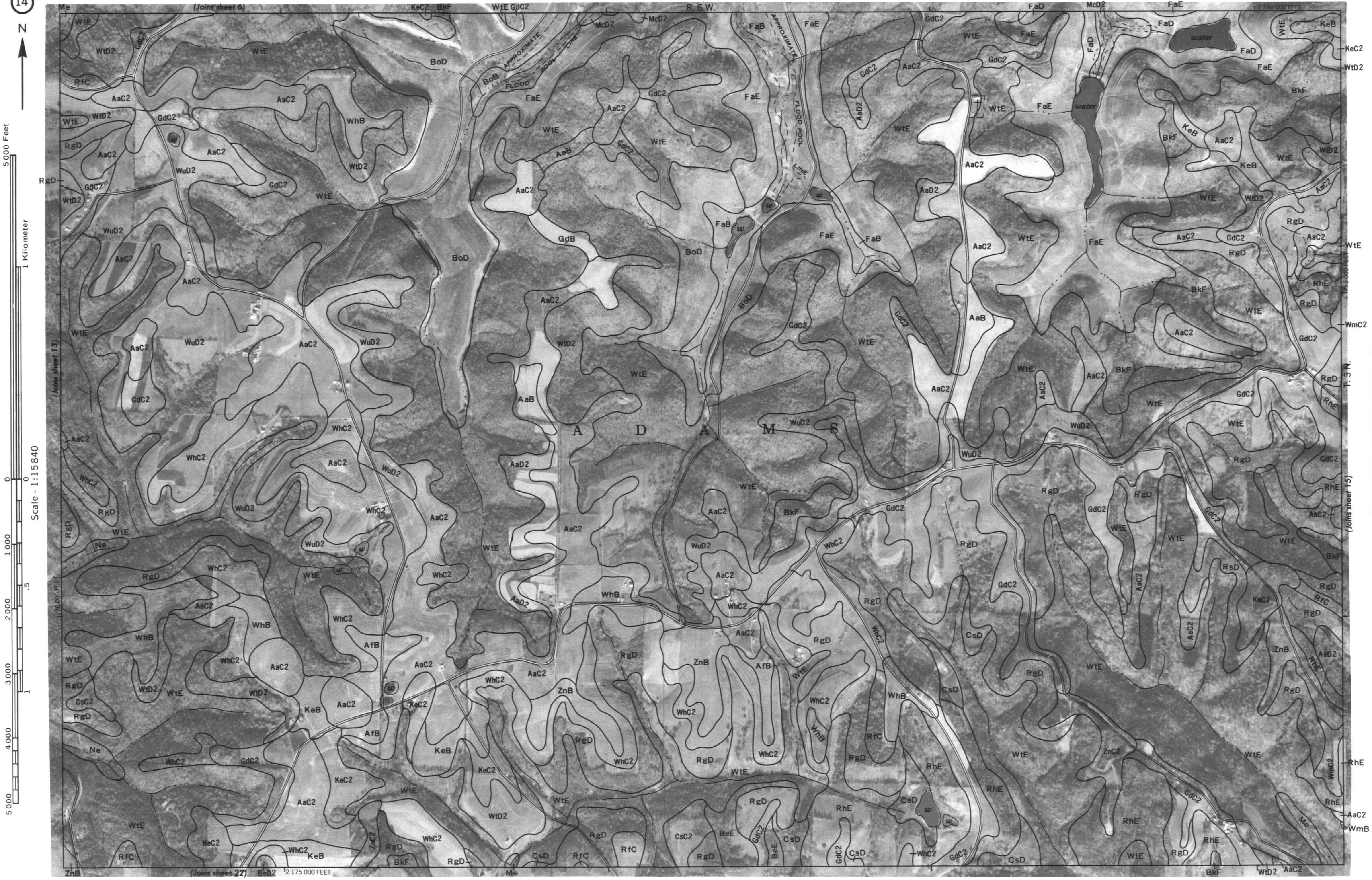
MUSKINGUM COUNTY, OHIO — SHEET NUMBER 13


13
2 155 000 FEET
R. 7 W. | R. 6 W.
(Joins sheet 5)
MUSKINGUM RIVER
T. 3 N.
M A D I S O N
A D A M S
(Joins sheet 12)
(Joins sheet 14)
(Joins sheet 21)
North Branch
2 170 000 FEET
15
20
208
N
5 000 Feet
1 Kilometer
Scale - 1:15840

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MUSKINGUM COUNTY, OHIO NO. 13

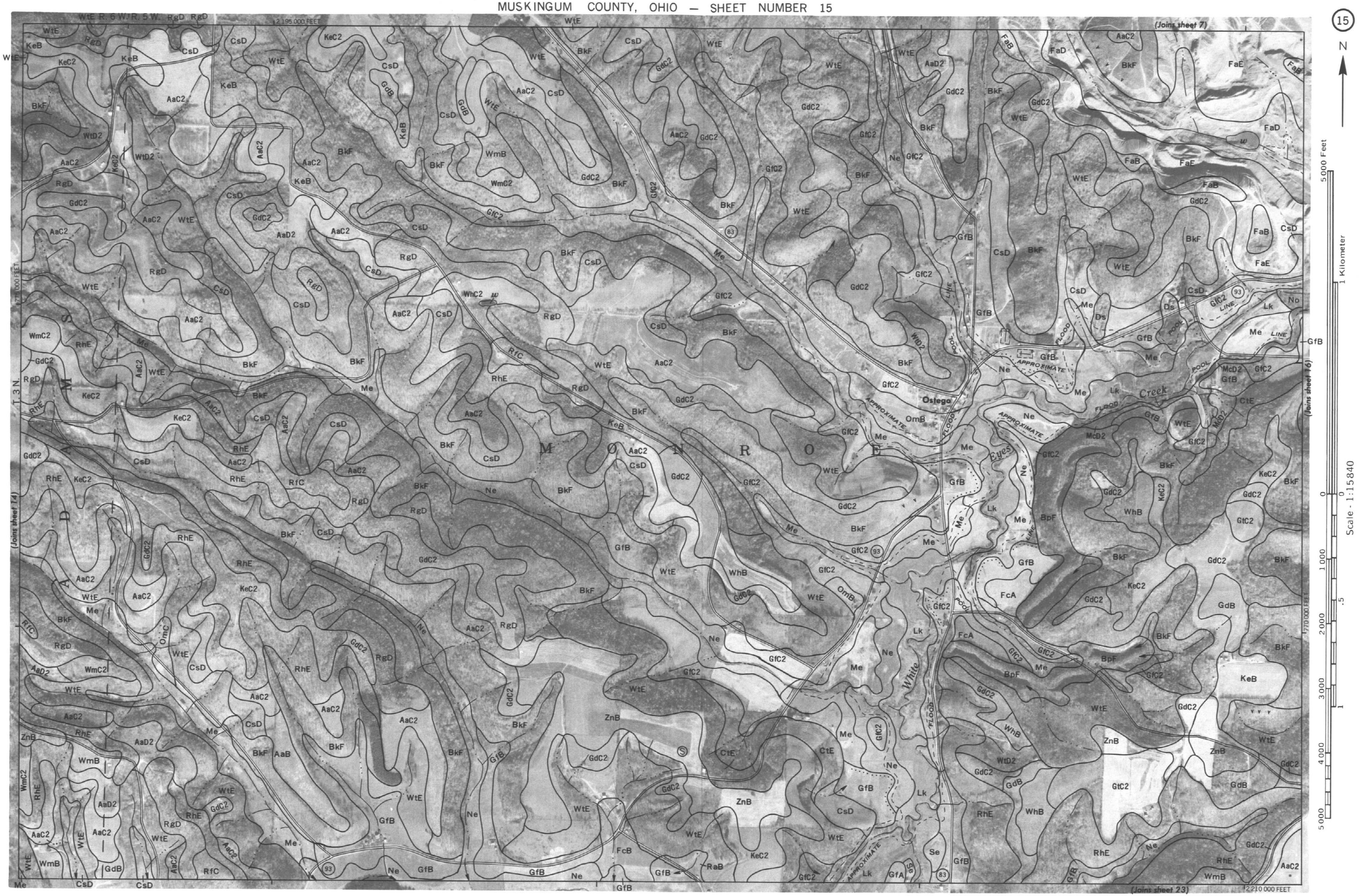
MUSKINGUM COUNTY, OHIO — SHEET NUMBER 14


N
5000 Feet
1 Kilometer
Scale - 1:15840
0
1000
2000
3000
4000
5000
0
.5
1
(Joins sheet 6)
(Joins sheet 13)
(Joins sheet 15)
(Joins sheet 22)
R. 6 W.
T. 3 N.
A D A M S
APPROXIMATE FLOOD POOL LINE
water
w
2 175 000 FEET
2 190 000 FEET
170 000 FEET
175 000 FEET

MUSKINGUM COUNTY, OHIO NO. 14

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MUSKINGUM COUNTY, OHIO — SHEET NUMBER 15

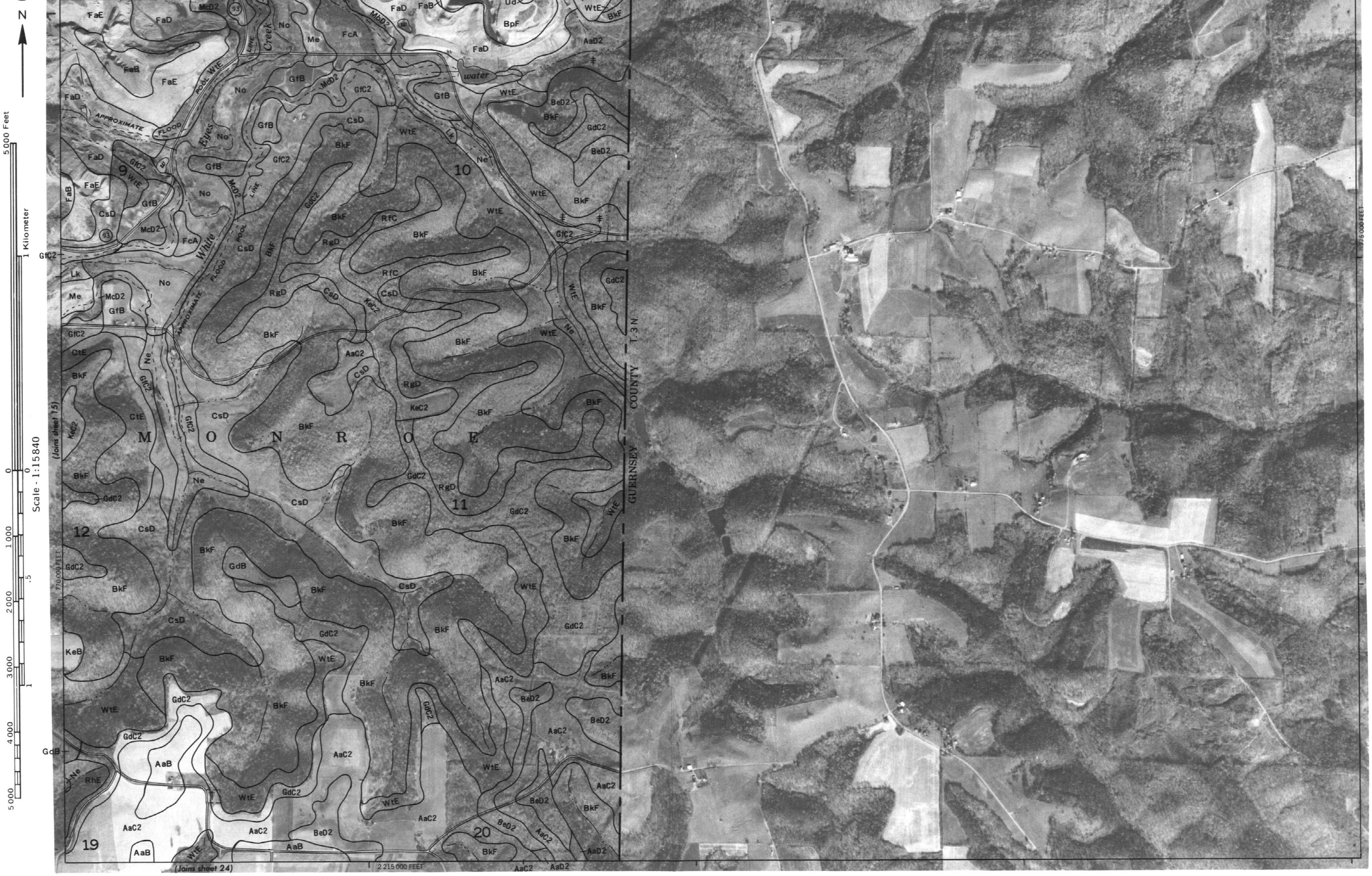


(15)
N
(Joins sheet 7)
(Joins sheet 16)
(Joins sheet 23)
(Joins sheet 14)
R. 6 W. R. 5 W.
T. 3 N.
2 195 000 FEET
2 210 000 FEET
170 000 FEET
M O N R O E
A D A M S
Ostego
Eyes Creek
White Eyes
Creek
APPROXIMATE FLOOD POOL LINE
93
83
5 000 Feet
1 Kilometer
Scale 1:15840
0
1000
2000
3000
4000
5000
.5
1
BkF
WtE
CsD
AaC2
GdC2
GfC2
RgD
KeC2
Me
Ne
GfB
RhE
ZnB
FcA
Lk
BpF
McD2
WhB
FaE
FaB
FaD

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MUSKINGUM COUNTY, OHIO NO. 15

MUSKINGUM COUNTY, OHIO — SHEET NUMBER 16


N
5 000 Feet
1 Kilometer
Scale - 1:15840
0
1 000
2 000
3 000
4 000
5 000
0
.5
1
(Joins sheet 8)
R. 5 W.
(Joins sheet 15)
(Joins sheet 24)
T. 3 N.
GUERNSEY COUNTY
M O N R O E
White Eyes Creek
APPROXIMATE FLOOD POOL LINE
water
93
9
10
11
12
19
20
2 215 000 FEET
2 230 000 FEET
770 000 FEET
775 000 FEET
FaE
FaD
FaB
FcA
McD2
GfB
GfC2
Me
No
Ne
Lk
Ud
BpF
WtE
BkF
AaD2
AaC2
AaB
BeD2
GdC2
GdB
CsD
RfC
RgD
KeC2
KeB
CtE
RhE

MUSKINGUM COUNTY, OHIO NO. 16

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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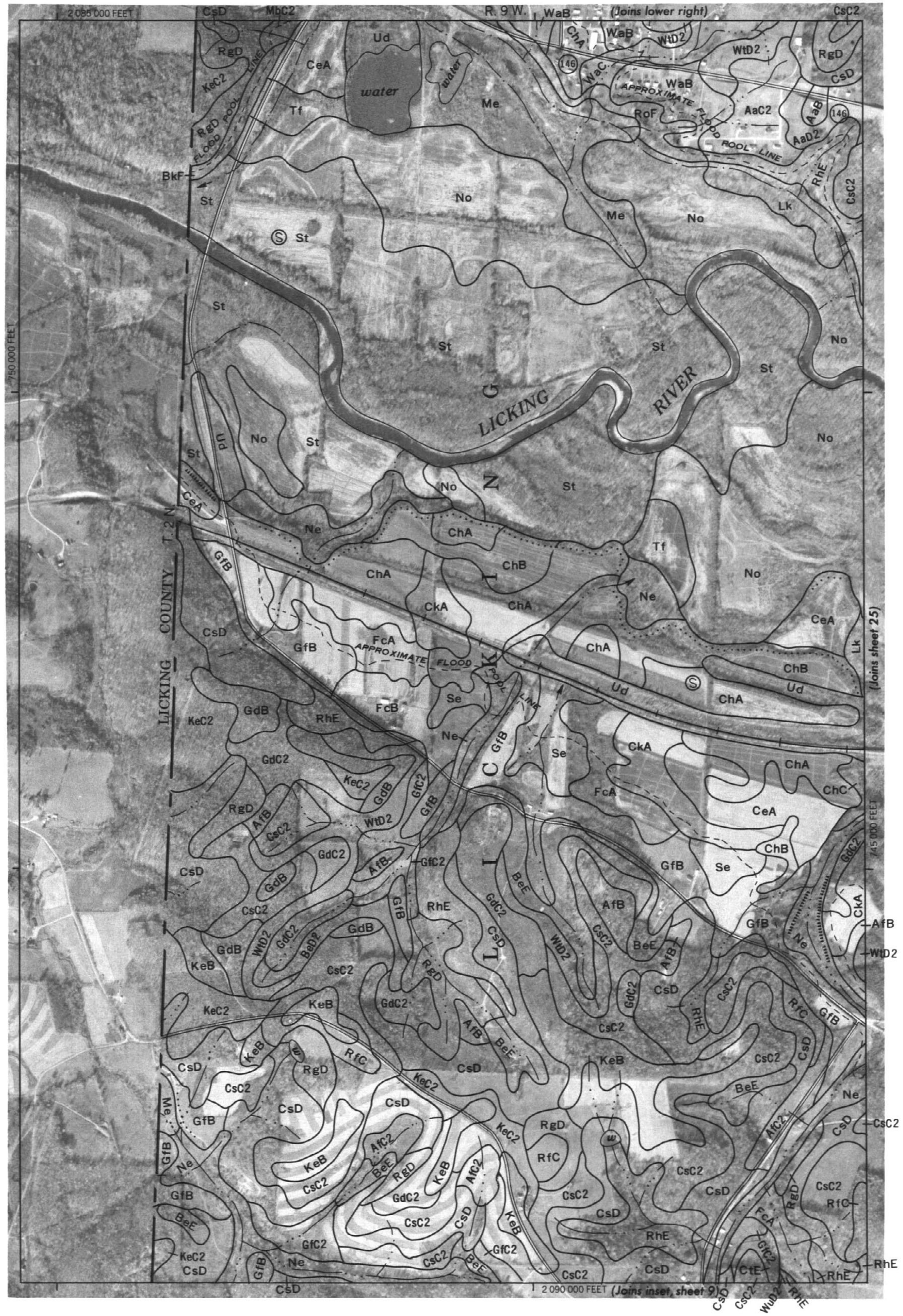
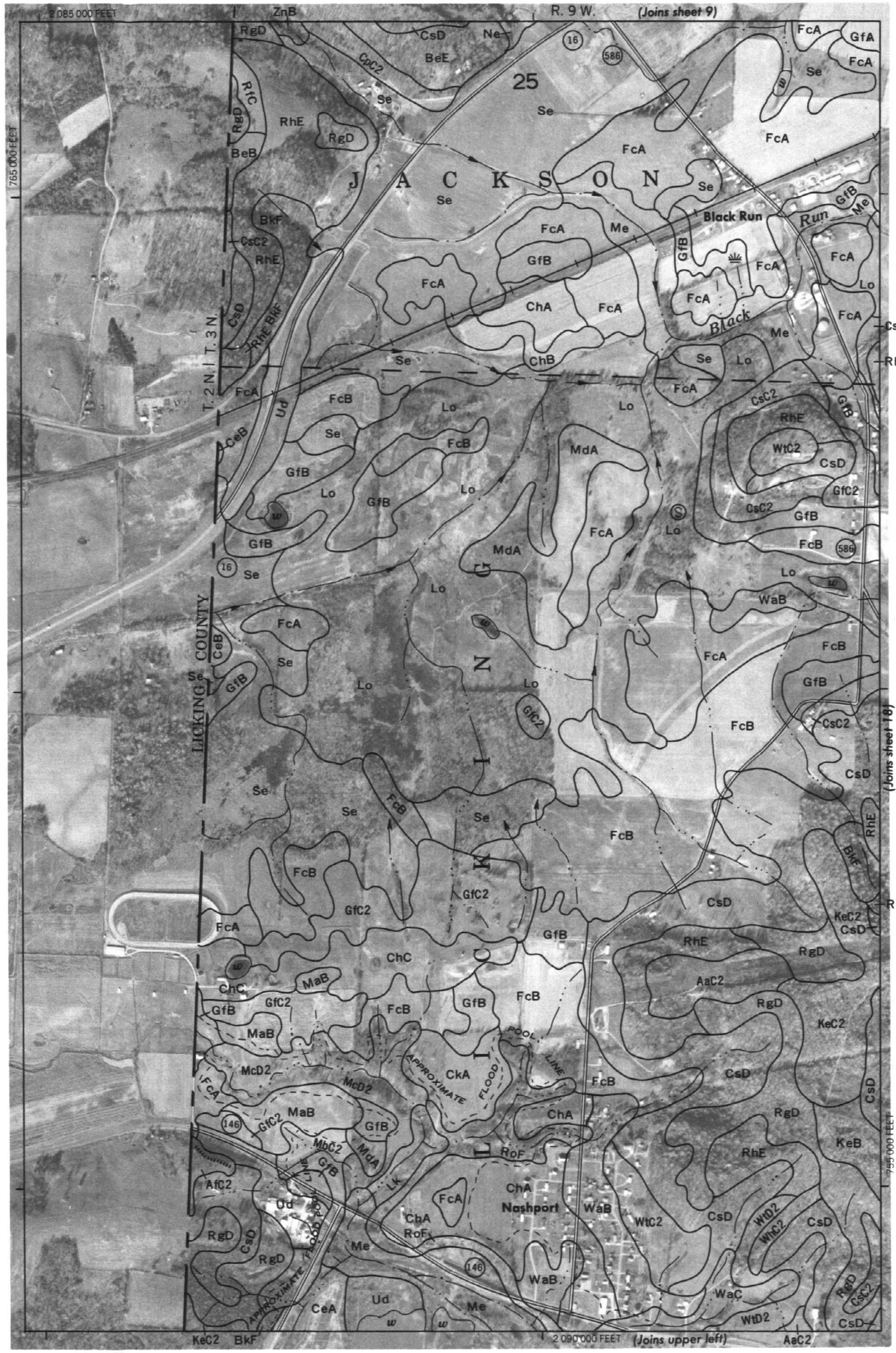
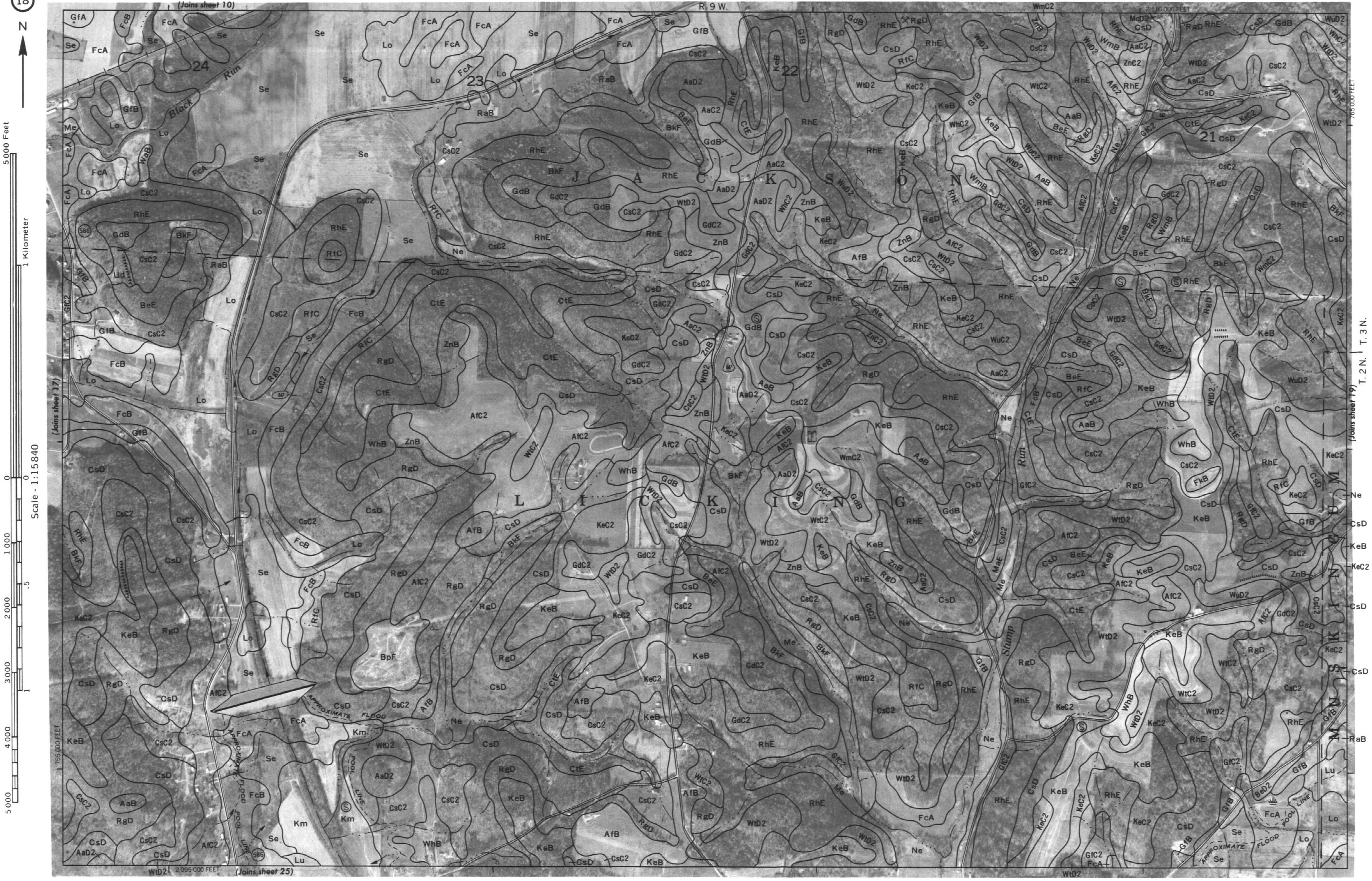
MUSKINGUM COUNTY, OHIO NO. 17


2 095 000 FEET
R. 9 W.
(Joins lower right)
water
LICKING RIVER
APPROXIMATE FLOOD POOL LINE
LICKING COUNTY
T. 2 N.
(Joins sheet 25)
745 000 FEET
750 000 FEET
2 090 000 FEET
(Joins inset, sheet 9)
St
No
Me
ChA
ChB
CkA
FcA
FcB
GfB
GdB
GdC2
CsD
CsC2
KeC2
KeB
RhE
RgD
Ud
Ne
Se
Tf
CeA
BeE
AfB
WtD2
RfC
GfC2
WaB
AaC2
146


2 085 000 FEET
R. 9 W.
(Joins sheet 9)
765 000 FEET
J A C K S O N
25
Black Run
Black Run
LICKING COUNTY
T. 2 N.
T. 3 N.
L I C K I N G
APPROXIMATE FLOOD POOL LINE
Nashport
(Joins sheet 18)
760 000 FEET
2 090 000 FEET
(Joins upper left)
16
586
146
Se
FcA
FcB
GfB
GfC2
Lo
MdA
ChA
ChB
ChC
CkA
MaB
McD2
MbC2
CsD
CsC2
RhE
RgD
KeC2
KeB
AaC2
WtC2
WtD2
WaB
WaC
Ud
Me
CeA
BkF

N
5 000 Feet
1 Kilometer
0
1 000
2 000
3 000
4 000
5 000
.5
1
Scale - 1:15840

MUSKINGUM COUNTY, OHIO — SHEET NUMBER 18


N
5 000 Feet
1 Kilometer
Scale - 1:15840
0
1 000
2 000
3 000
4 000
5 000
0
.5
1
(Joins sheet 10)
(Joins sheet 17)
(Joins sheet 19)
(Joins sheet 25)
R. 9 W.
T. 3 N.
T. 2 N.
2 110 000 FEET
765 000 FEET
755 000 FEET
2 095 000 FEET
Black Run
Stump Run
J A C K S O N
L I C K I N G
M U S K I N G U M
24
23
22
21
586
APPROXIMATE FLOOD POOL LINE
Se
Lo
FcA
FcB
GfB
CsC2
CsD
RhE
RgD
KeB
KeC2
WtD2
AaD2
AaC2
AfC2
AfB
CtE
BkF
BpF
Km
Ne
Me
WhB
ZnB
GdB
GdC2
RfC
BeE
WmC2
Lu
RaB

MUSKINGUM COUNTY, OHIO NO. 18

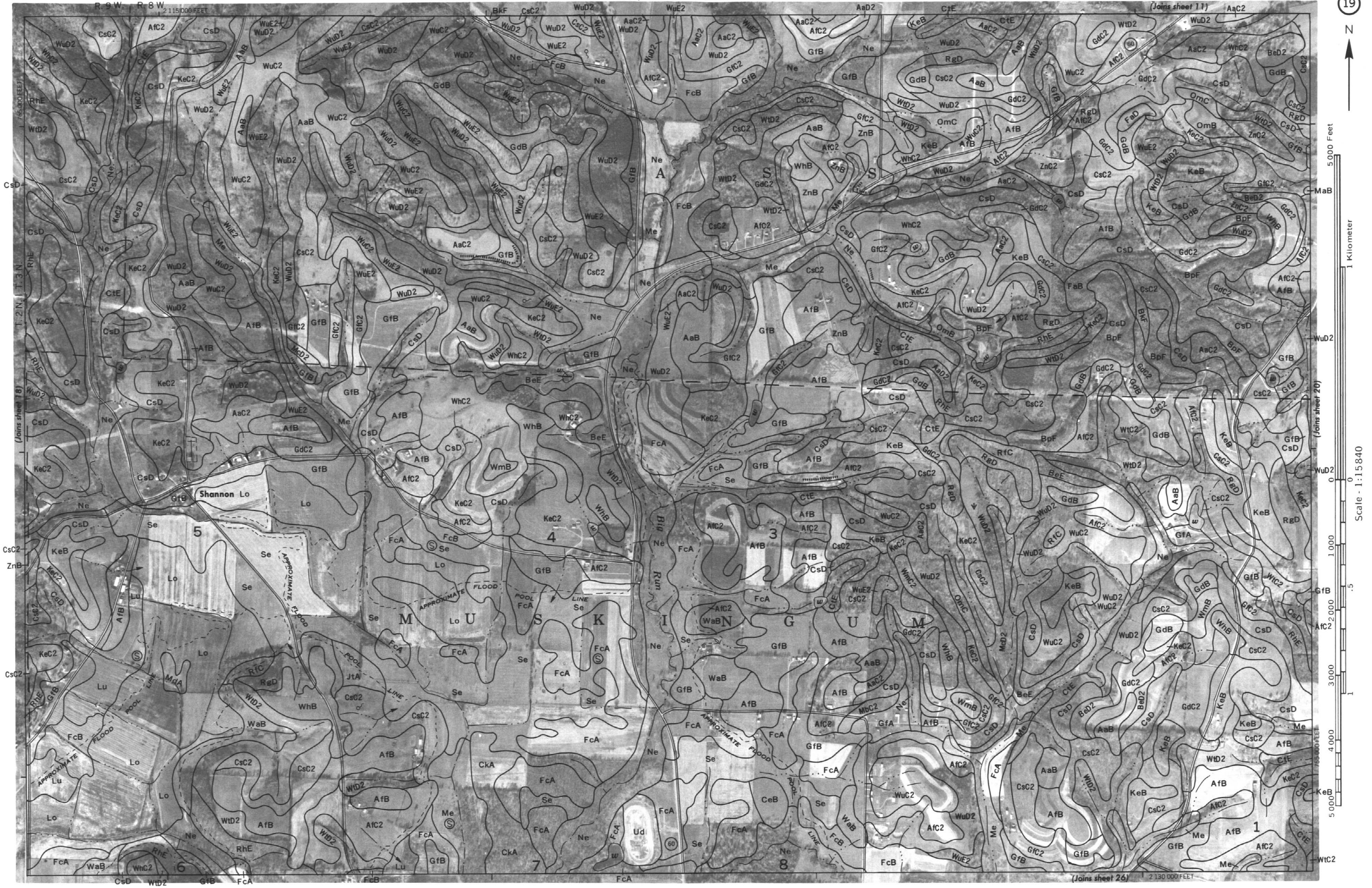
This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MUSKINGUM COUNTY, OHIO — SHEET NUMBER 19

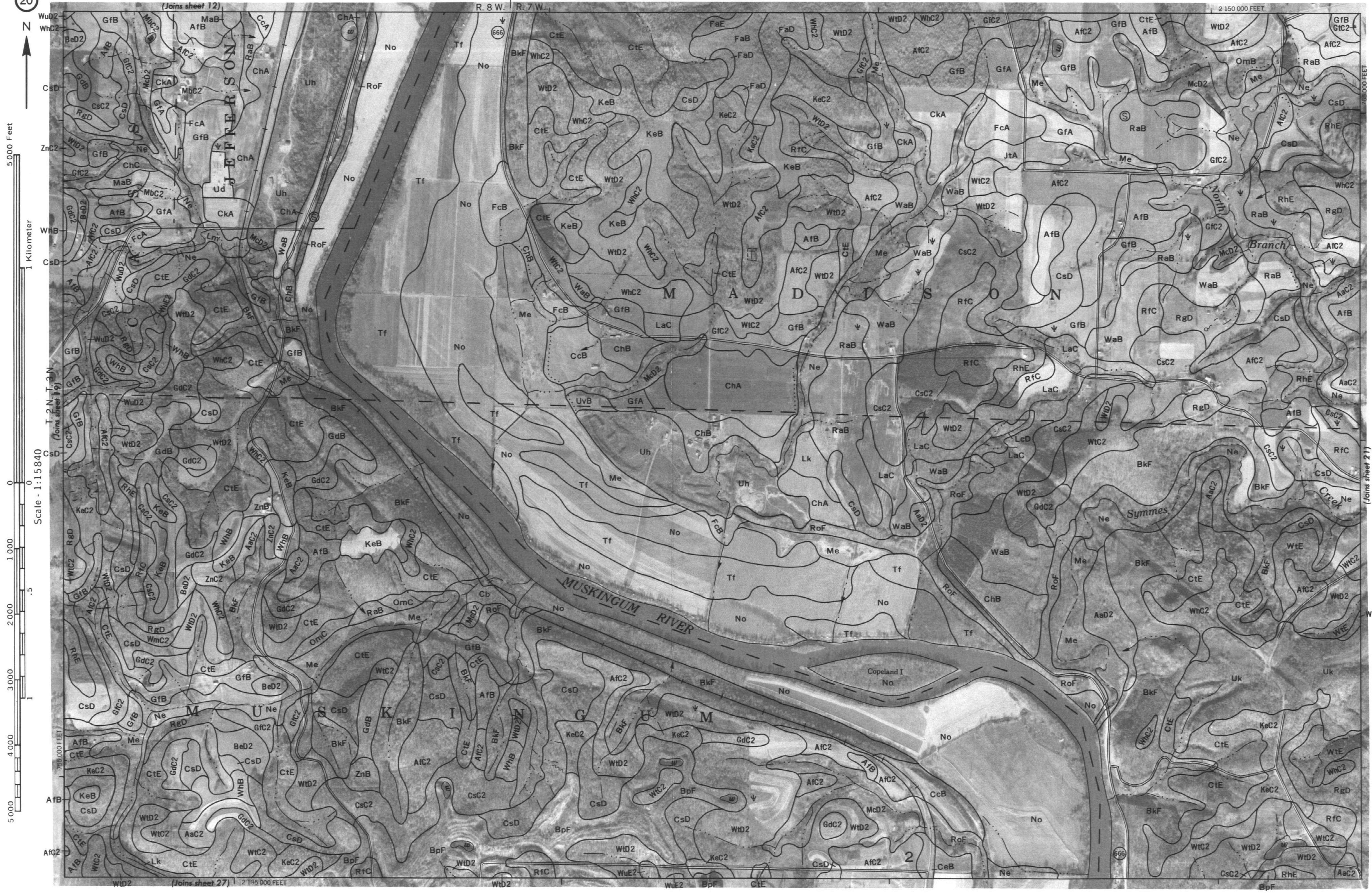
⑲

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MUSKINGUM COUNTY, OHIO NO. 19


R 9 W
R 8 W
2 115 000 FEET
765 000 FEET
T 2 N
T 3 N
(Joins sheet 11)
(Joins sheet 18)
(Joins sheet 20)
(Joins sheet 26)
2 130 000 FEET
750 000 FEET
C A S S
M U S K I N G U M
Shannon
Big Run
APPROXIMATE FLOOD POOL LINE
1
2
3
4
5
6
7
8
60
N
5000 Feet
1 Kilometer
Scale 1:15840
0
1000
2000
3000
4000
5000
0
.5
1

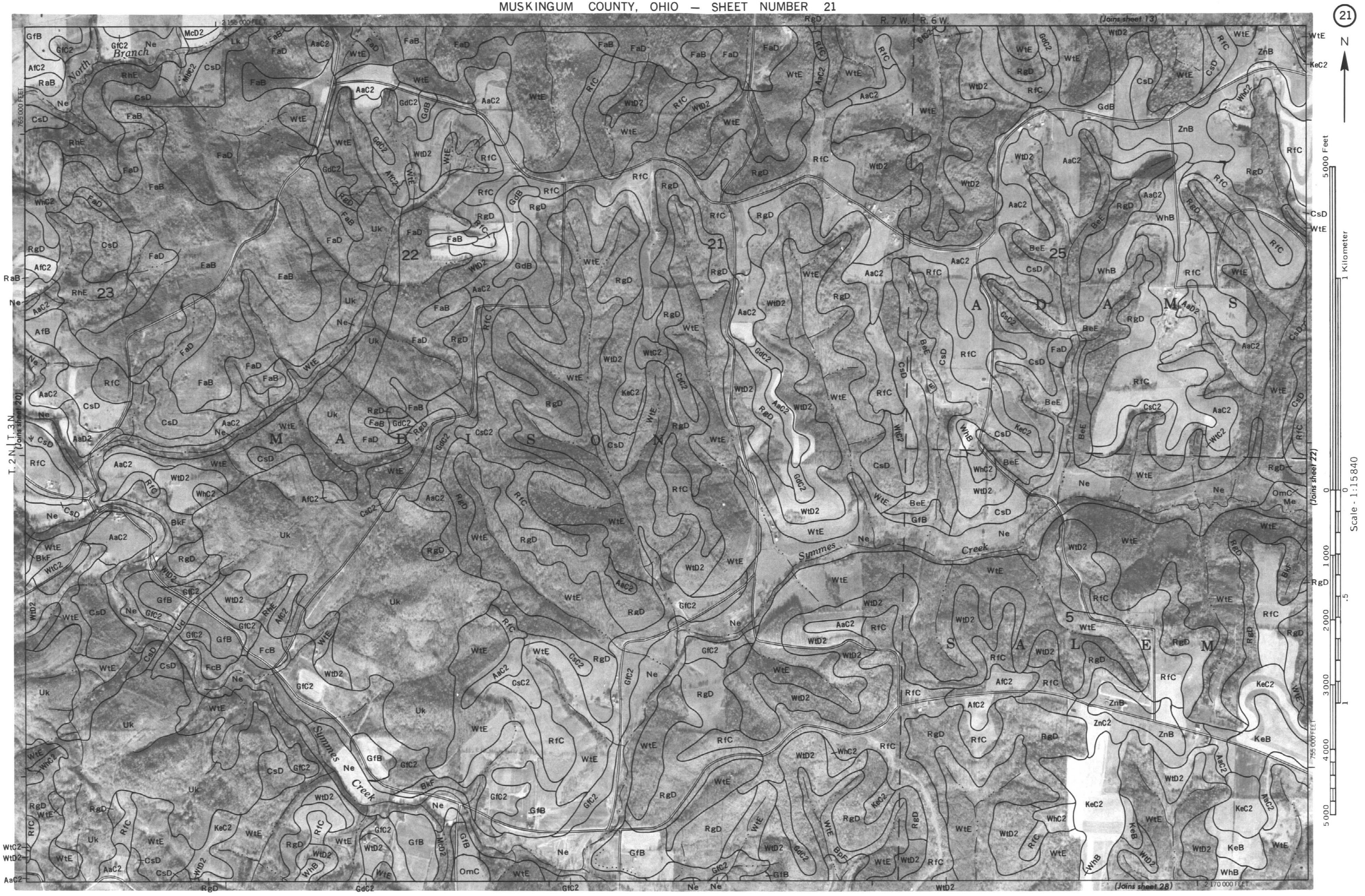
MUSKINGUM COUNTY, OHIO — SHEET NUMBER 20


20
N
(Joins sheet 12)
R. 8 W.
R. 7 W.
2 150 000 FEET
750 000 FEET
JEFFERSON
MADISON
MUSKINGUM
MUSKINGUM RIVER
North Branch
Symmes Creek
Copeland I
T. 2 N.
T. 3 N.
(Joins sheet 19)
(Joins sheet 21)
(Joins sheet 27)
2 195 000 FEET
755 000 FEET
666
5 000 Feet
1 Kilometer
Scale - 1:15840
0
1000
2000
3000
4000
5000
.5
1

MUSKINGUM COUNTY, OHIO NO. 20

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MUSKINGUM COUNTY, OHIO — SHEET NUMBER 21

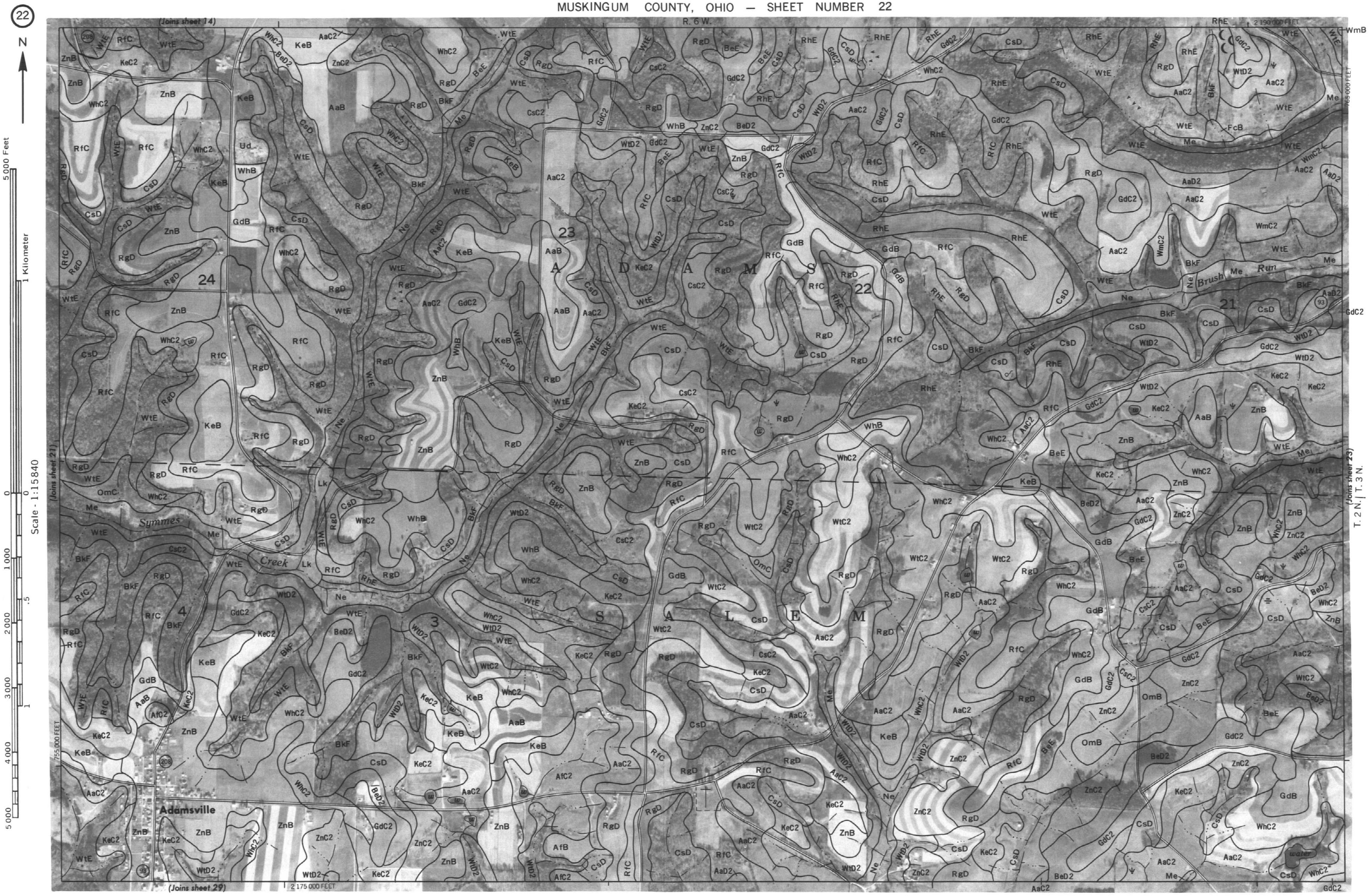


(21)
N
(Joins sheet 13)
(Joins sheet 20)
(Joins sheet 22)
(Joins sheet 28)
R. 7 W. | R. 6 W.
T. 2 N. | T. 3 N.
2 155 000 FEET
2 170 000 FEET
765 000 FEET
755 000 FEET
North Branch
Symmes Creek
MADISON
ADAMS
SALEM
21
22
23
25
5
5000 Feet
1 Kilometer
0
1000
2000
3000
4000
5000
.5
1
Scale - 1:15 840

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MUSKINGUM COUNTY, OHIO NO. 21

MUSKINGUM COUNTY, OHIO — SHEET NUMBER 22


22
N
5 000 Feet
1 Kilometer
Scale - 1:15 840
0
1000
2000
3000
4000
5000
.5
1
(Joins sheet 14)
(Joins sheet 21)
(Joins sheet 23)
(Joins sheet 29)
R. 6 W.
T. 2 N. | T. 3 N.
2 190 000 FEET
765 000 FEET
755 000 FEET
2 175 000 FEET
A D A M S
S A L E M
Adamsville
Symmes Creek
Brush Run
24
23
22
21
4
3
208
93
water

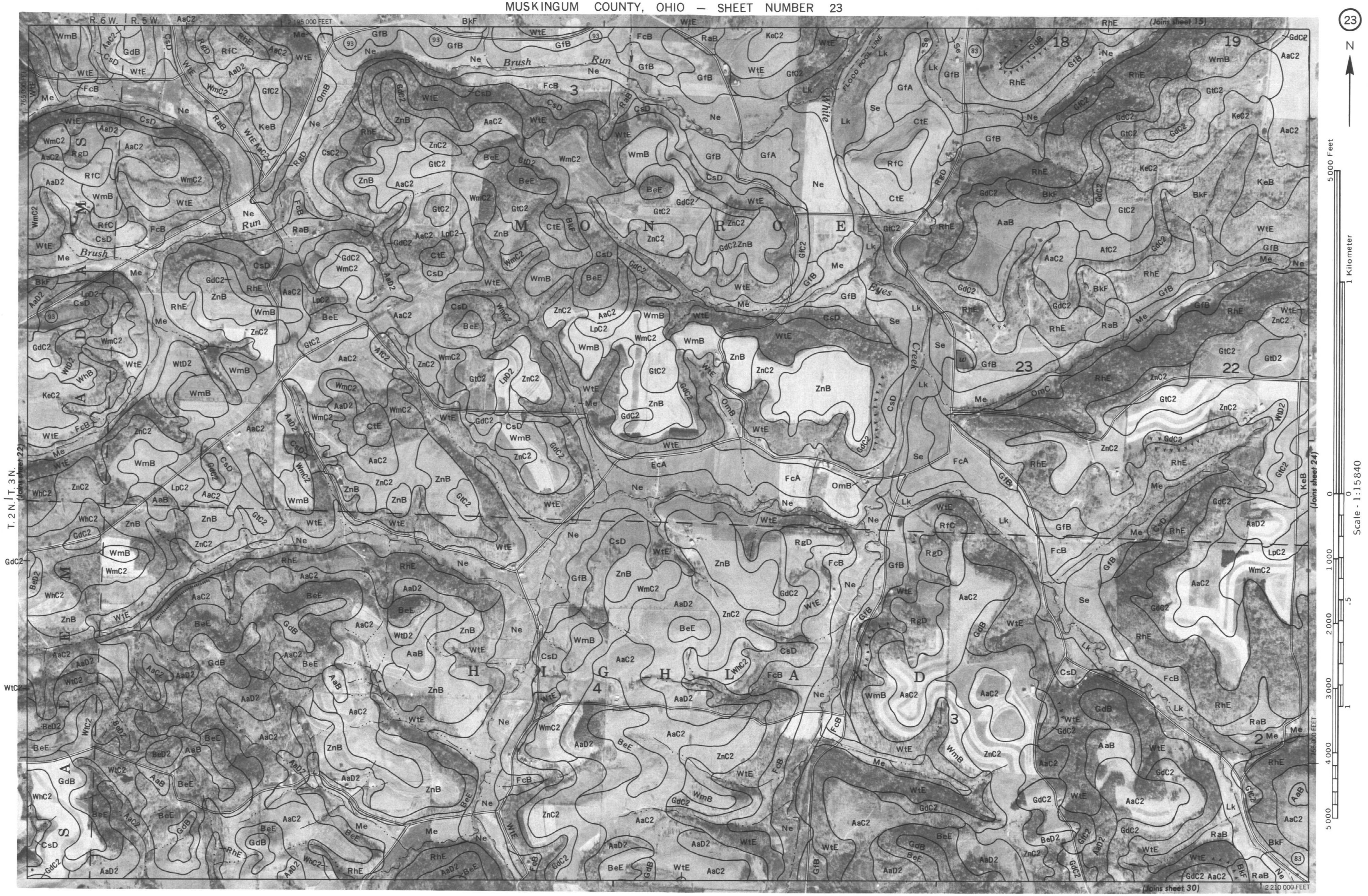
MUSKINGUM COUNTY, OHIO NO. 22

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MUSKINGUM COUNTY, OHIO — SHEET NUMBER 23

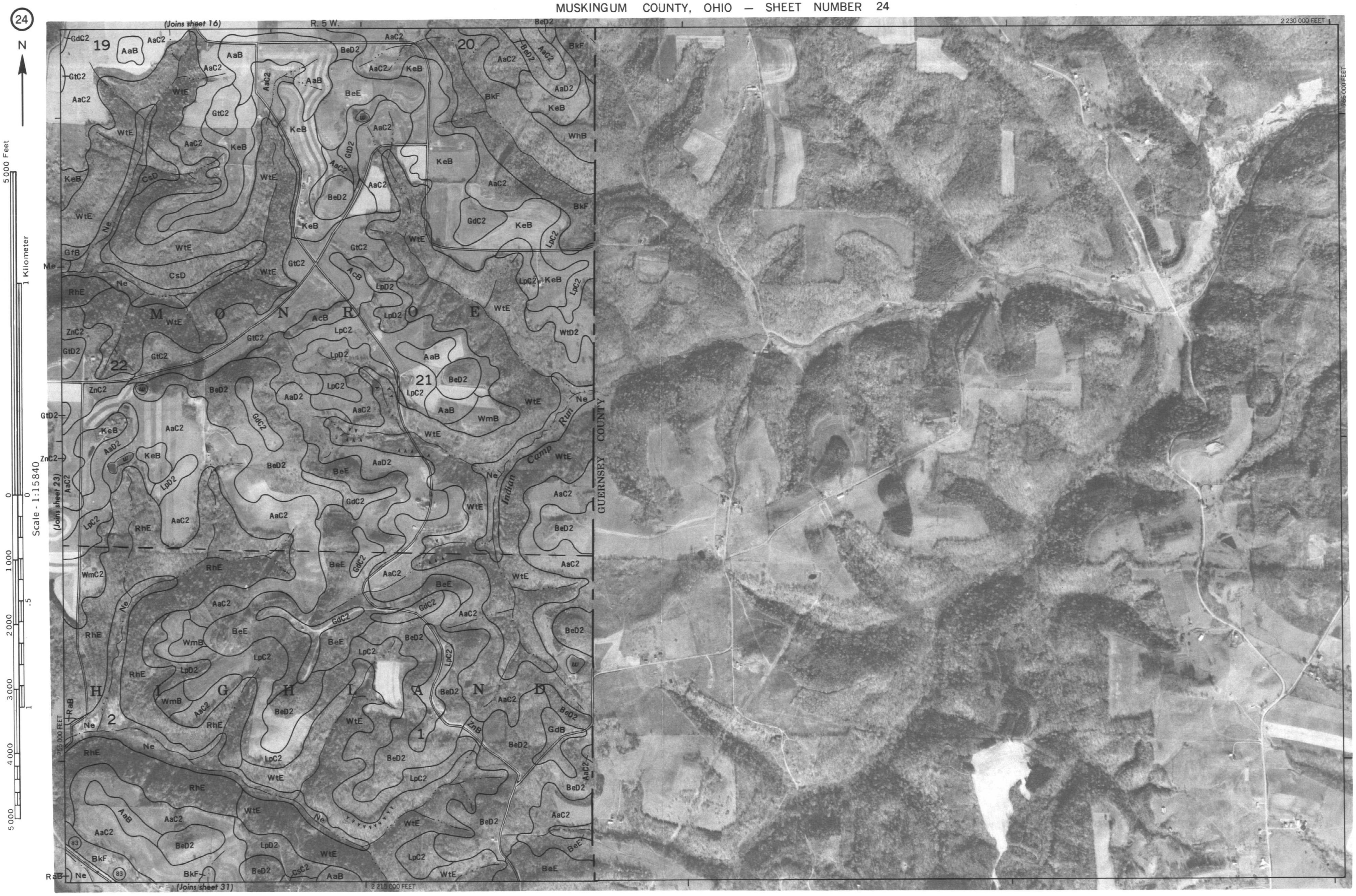
This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MUSKINGUM COUNTY, OHIO NO. 23



23
N
R. 6 W.
R. 5 W.
2 195 000 FEET
(Joins sheet 15)
(Joins sheet 22)
(Joins sheet 24)
(Joins sheet 30)
2 210 000 FEET
T. 2 N.
T. 3 N.
M O N R O E
H I G H L A N D
S A L E M
Brush Run
Brush
Run
White Eyes Creek
FLOOD POOL LINE
93
83
3
18
19
23
22
4
2
5 000 Feet
1 Kilometer
0
1000
2000
3000
4000
5000
.5
1
Scale - 1:15840

MUSKINGUM COUNTY, OHIO — SHEET NUMBER 24


24
N
(Joins sheet 16)
R. 5 W.
(Joins sheet 23)
(Joins sheet 31)
2 230 000 FEET
765 000 FEET
2 215 000 FEET
5 000 Feet
1 Kilometer
Scale - 1:15 840
0
1000
2000
3000
4000
5000
.5
1
19
20
21
22
2
1
M O N R O E
H I G H L A N D
GUERNSEY COUNTY
Indian Camp Run
83
AaB
AaC2
AaD2
AcB
BeD2
BeE
BkF
CsC2
CsD
GdB
GdC2
GdC2
GfB
GtC2
GtD2
KeB
LpC2
LpD2
Ne
RaB
RhE
WhB
WmB
WmC2
WtD2
WtE
ZnB
ZnC2
w

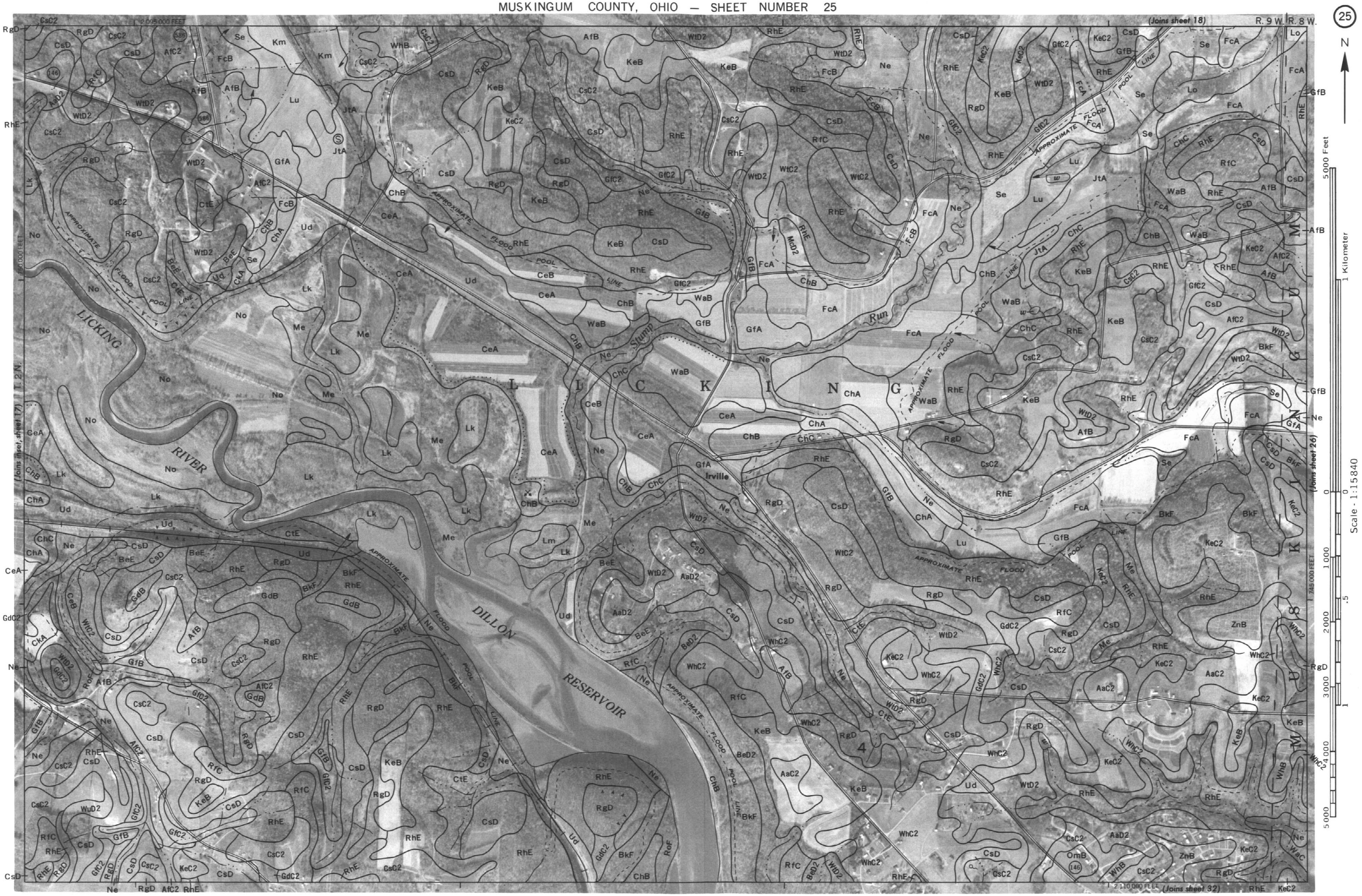
MUSKINGUM COUNTY, OHIO NO. 24

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

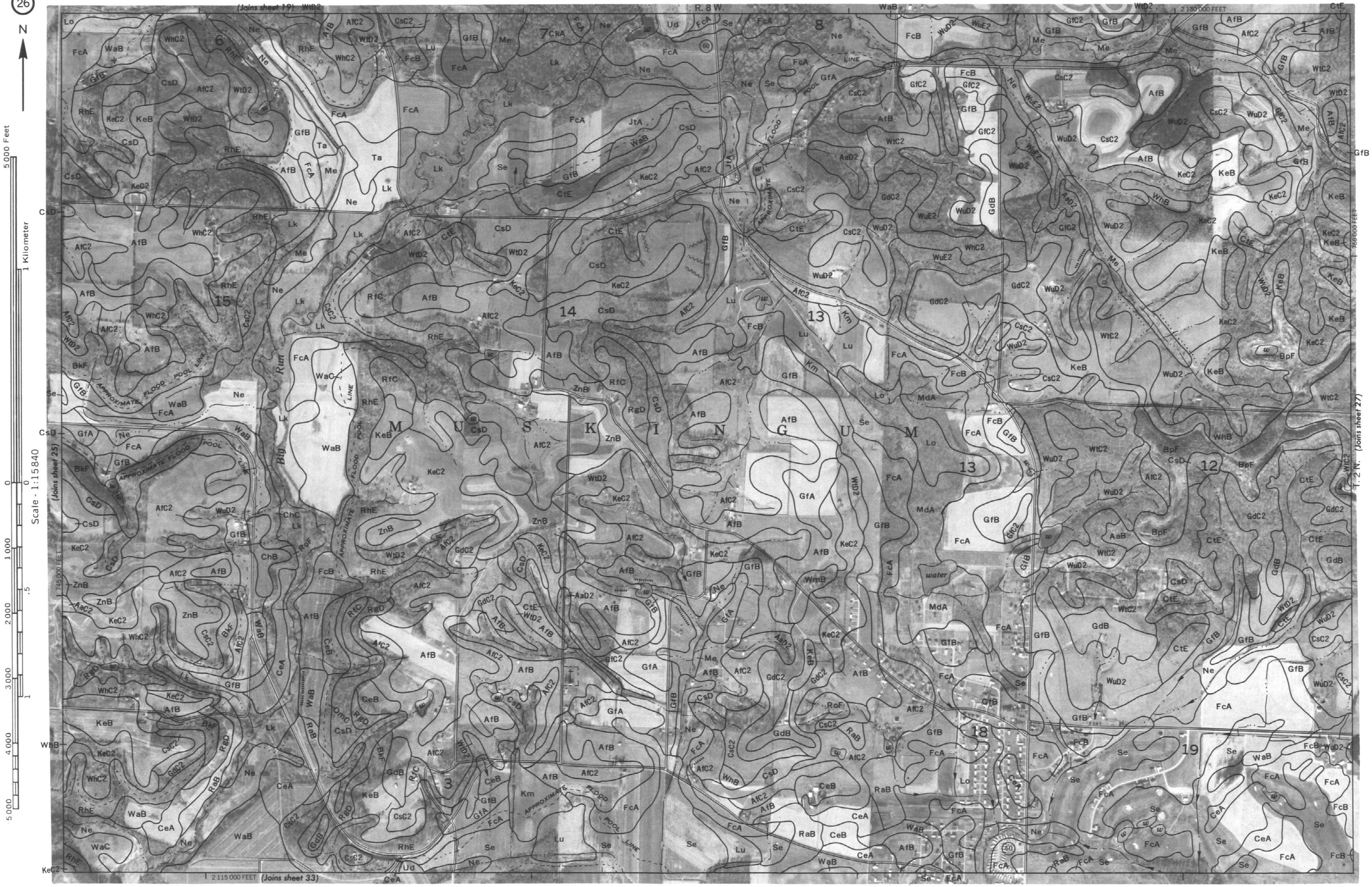
MUSKINGUM COUNTY, OHIO — SHEET NUMBER 25

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MUSKINGUM COUNTY, OHIO NO. 25


25
(Joins sheet 18)
R. 9 W. R. 8 W.
N
2 095 000 FEET
LICKING RIVER
L I C K I N G
Stump Run
Irville
DILLON RESERVOIR
APPROXIMATE FLOOD POOL LINE
M U S K I N G U M
(Joins inset, sheet 17)
T. 2 N.
(Joins sheet 26)
(Joins sheet 32)
2 110 000 FEET
745 000 FEET
755 000 FEET
586
146
4
Scale 1:15840
5 000 Feet
4 000
3 000
2 000
1 000
0
1 Kilometer
.5
0
RgD
RhE
Lk
No
CeA
GdC2
Ne
CsD
GfB
AfB
RgD
KeC2
Lo

MUSKINGUM COUNTY, OHIO — SHEET NUMBER 26


26
N
(Joins sheet 19)
(Joins sheet 25)
(Joins sheet 27)
(Joins sheet 33)
R. 8 W.
T. 2 N.
2 130 000 FEET
2 115 000 FEET
760 000 FEET
745 000 FEET
M U S K I N G U M
Big Run
APPROXIMATE FLOOD POOL LINE
water
Scale - 1:15840
5 000 Feet
1 Kilometer
.5
0
1000
2000
3000
4000
5000

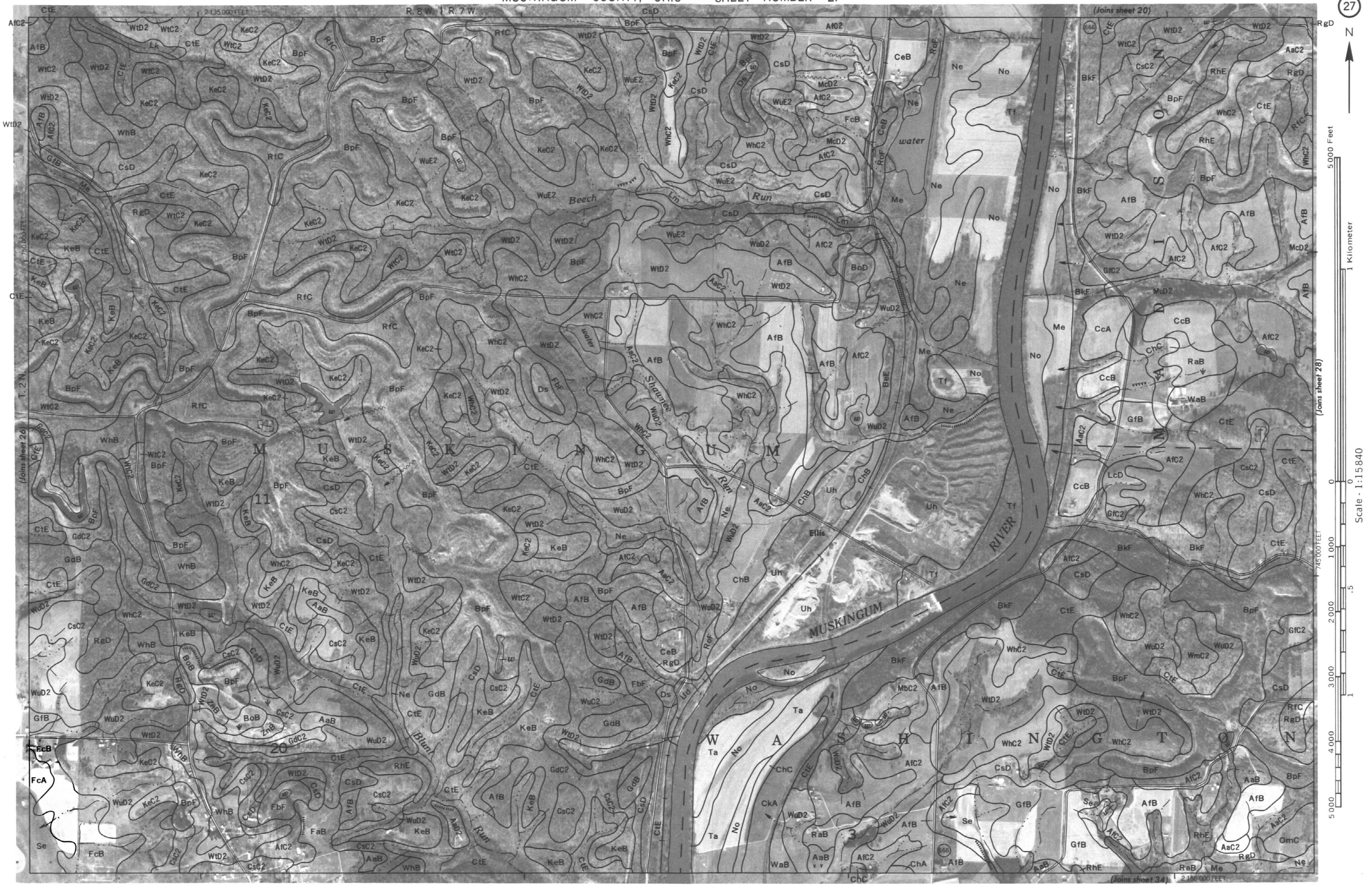
MUSKINGUM COUNTY, OHIO NO. 26

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MUSKINGUM COUNTY, OHIO — SHEET NUMBER 27

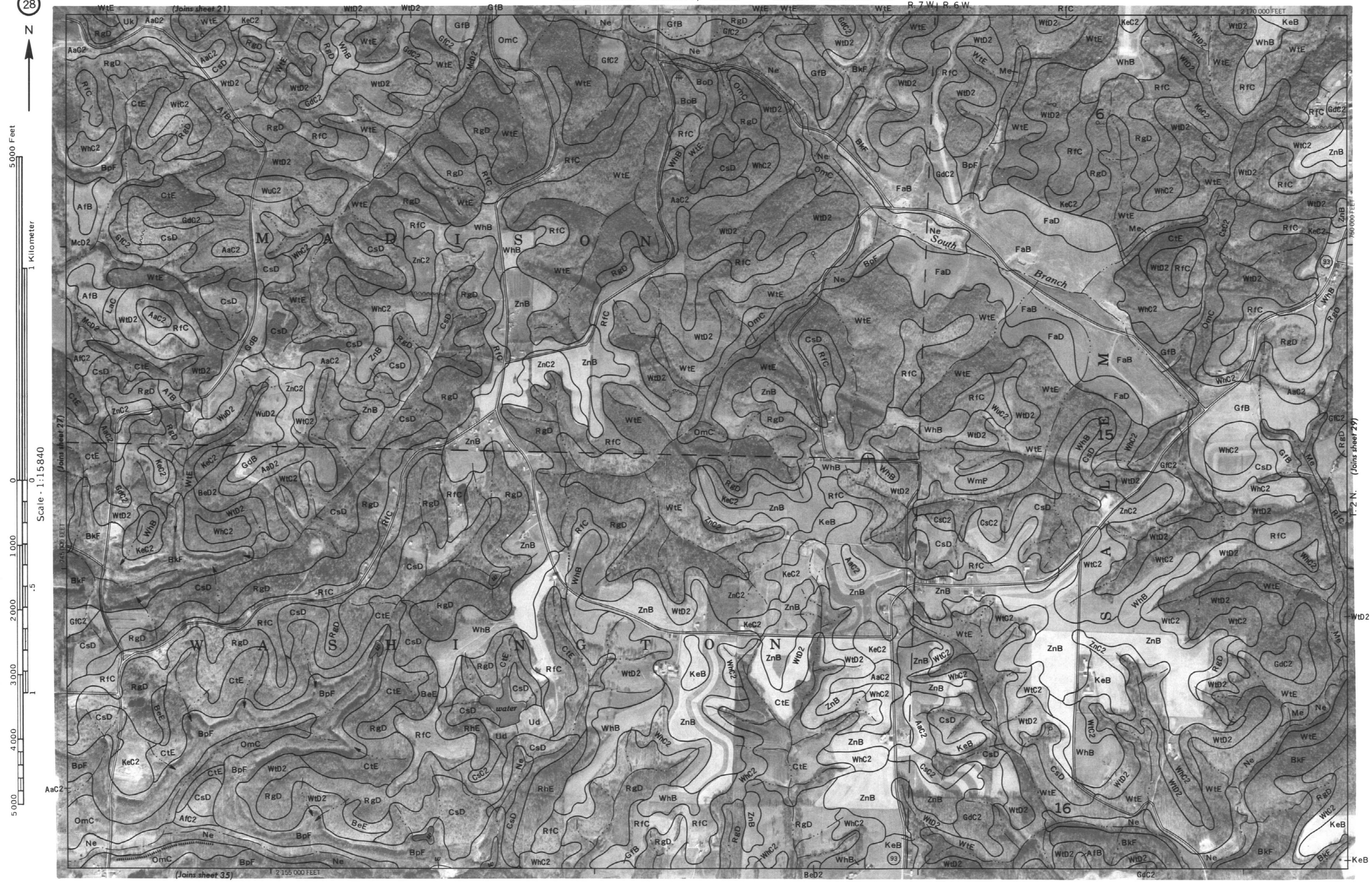
This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MUSKINGUM COUNTY, OHIO NO. 27



27
N
R. 8 W. | R. 7 W.
T. 2 N.
2 135 000 FEET
750 000 FEET
745 000 FEET
2 150 000 FEET
(Joins sheet 20)
(Joins sheet 26)
(Joins sheet 28)
(Joins sheet 34)
M U S K I N G U M
W A S H I N G T O N
M A D I S O N
MUSKINGUM RIVER
Beech Run
Shawnee Run
Blunt Run
Ellis
water
11
20
3
666
5000 Feet
1 Kilometer
0
1000
2000
3000
4000
5000
.5
1
Scale - 1:15840

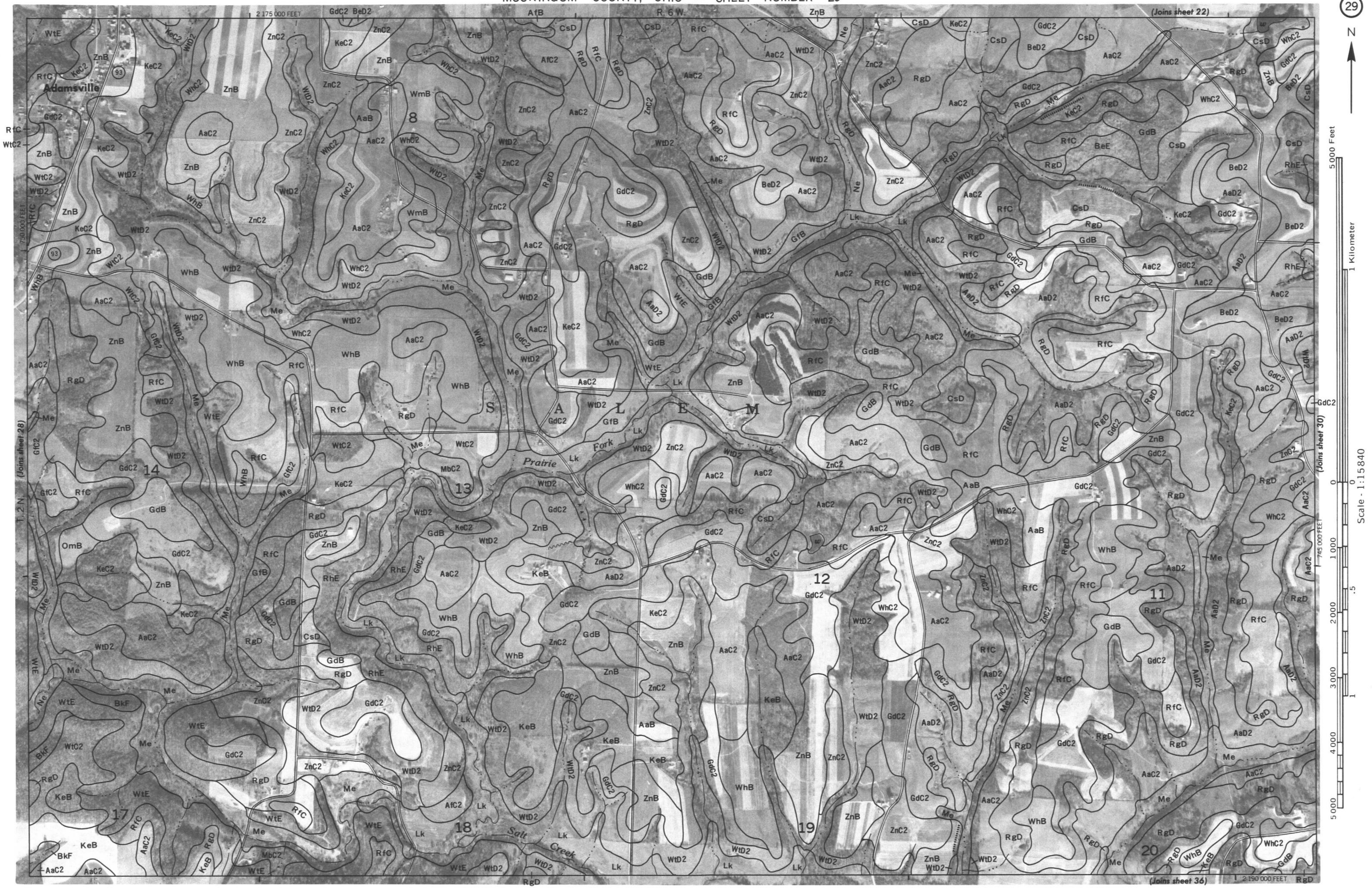
MUSKINGUM COUNTY, OHIO — SHEET NUMBER 28


28
N
5000 Feet
1 Kilometer
Scale - 1:15840
0
1000
2000
3000
4000
5000
0
.5
1
(Joins sheet 21)
(Joins sheet 27)
(Joins sheet 29)
(Joins sheet 35)
R. 7 W. | R. 6 W.
T. 2 N.
2 170 000 FEET
2 155 000 FEET
750 000 FEET
MADISON
WASHINGTON
SALEM
6
15
16
South Branch
water
93
WtE
RgD
RfC
WtD2
CsD
WhC2
ZnB
KeB
BpF
CtE
OmC
Ne
FaD
FaB
GfB

MUSKINGUM COUNTY, OHIO NO. 28

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

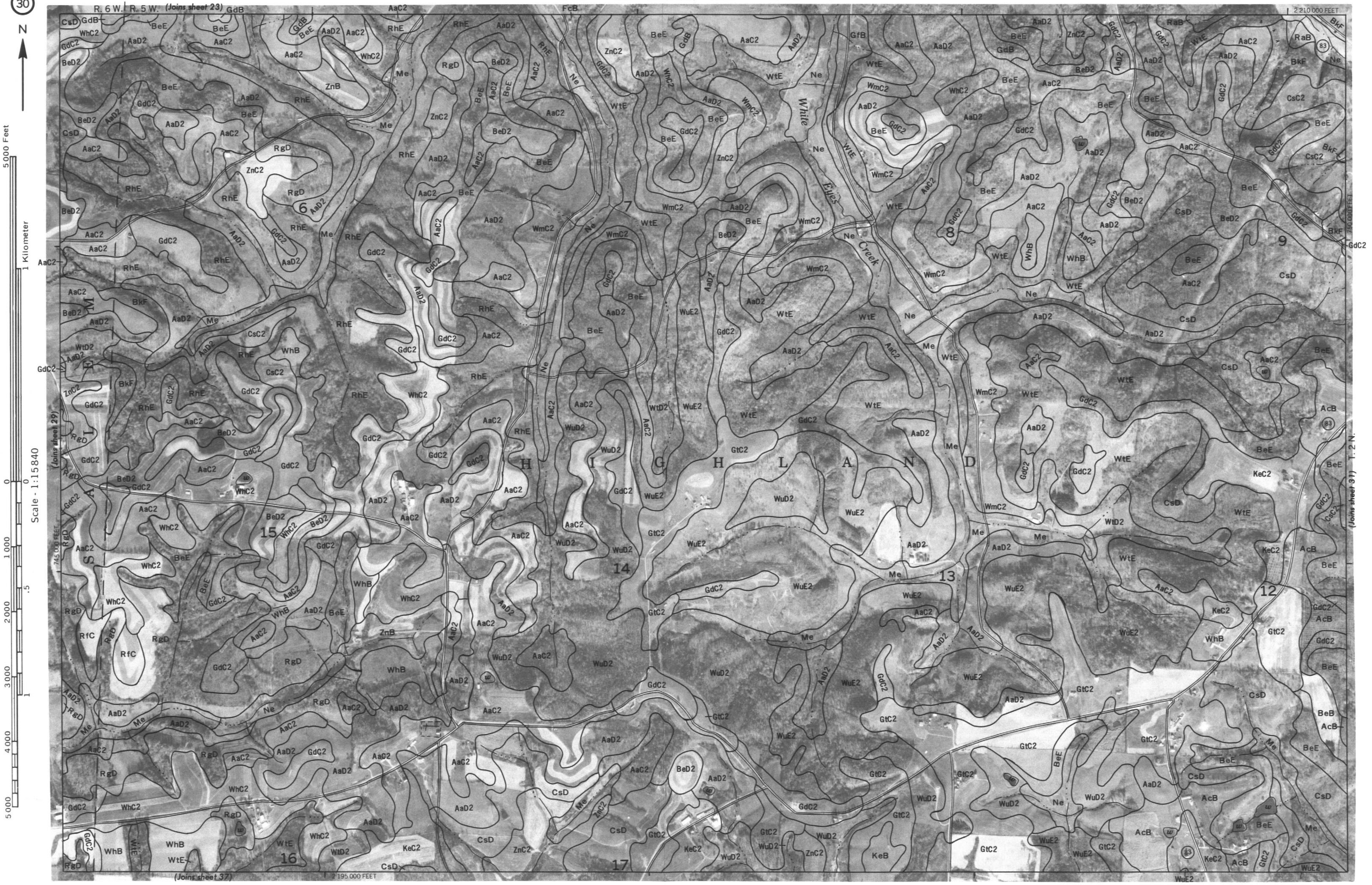
MUSKINGUM COUNTY, OHIO — SHEET NUMBER 29


29
N
(Joins sheet 22)
(Joins sheet 28)
(Joins sheet 30)
(Joins sheet 36)
2 175 000 FEET
2 190 000 FEET
750 000 FEET
745 000 FEET
R. 6 W.
T. 2 N.
Adamsville
93
SALEM
Prairie Fork
Salt Creek
7
8
11
12
13
14
17
18
19
20
5000 Feet
1 Kilometer
Scale 1:15840
0
1000
2000
3000
4000
5000
.5
1

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MUSKINGUM COUNTY, OHIO NO. 29

MUSKINGUM COUNTY, OHIO — SHEET NUMBER 30

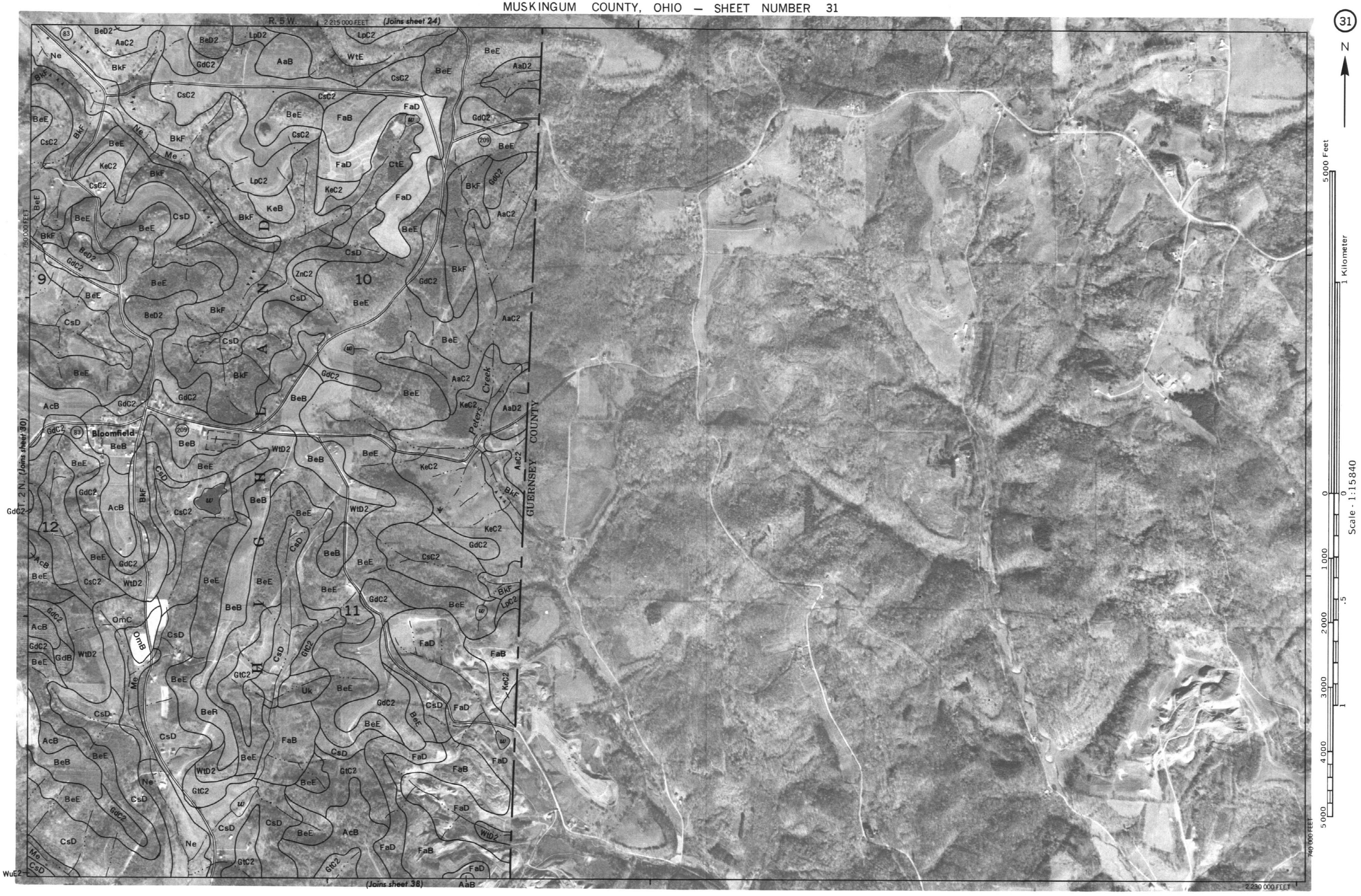

30
N
R. 6 W. | R. 5 W.
(Joins sheet 23)
(Joins sheet 29)
(Joins sheet 31)
(Joins sheet 37)
T. 2 N.
2 210 000 FEET
2 195 000 FEET
745 000 FEET
5 000 Feet
1 Kilometer
Scale - 1:15840
0
1 000
2 000
3 000
4 000
5 000
.5
1
White Eyes Creek
HIGHLAND
SALEM
6
7
8
9
12
13
14
15
16
17
83

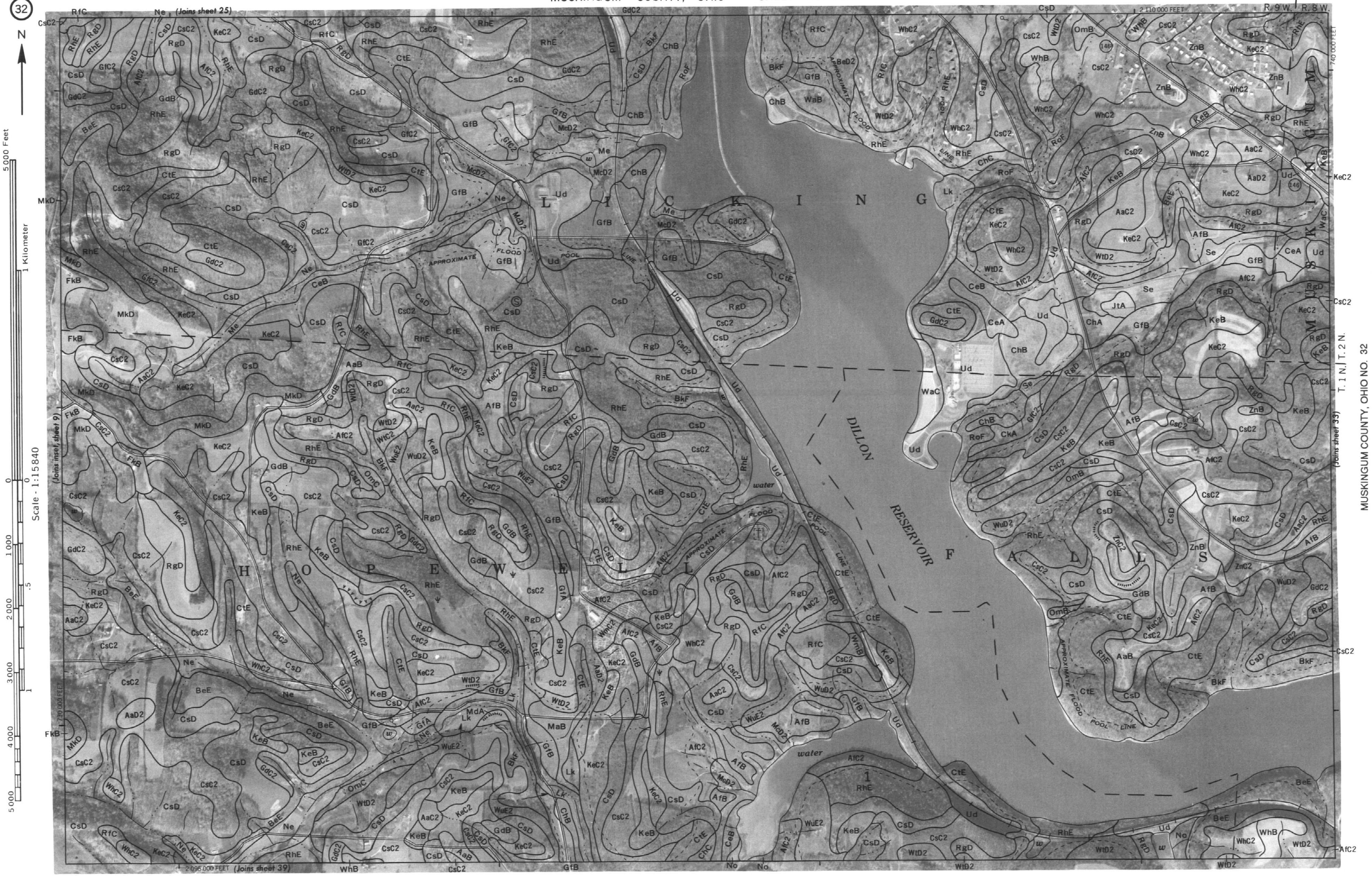
MUSKINGUM COUNTY, OHIO NO. 30

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MUSKINGUM COUNTY, OHIO NO. 31


R. 5 W.
2 215 000 FEET
(Joins sheet 24)
(Joins sheet 30)
(Joins sheet 38)
750 000 FEET
740 000 FEET
2 230 000 FEET
T. 2 N.
Bloomfield
Peters Creek
HIGHLAND
GUERNSEY COUNTY
83
209
9
10
11
12
BeD2
AaC2
BeE
LpD2
LpC2
AaB
WtE
AaD2
CsC2
FaD
FaB
GdC2
CtE
KeC2
KeB
LpC2
BkF
Ne
Me
CsD
ZnC2
AcB
BeB
WtD2
CsC2
AaC2
KeC2
AaD2
AaC2
OmC
OmB
GdB
GtC2
Uk
AcB
WuE2
w
N
5 000 Feet
1 Kilometer
Scale - 1:15840
0
1000
2000
3000
4000
5000
.5
1


32
N
5000 Feet
1 Kilometer
Scale - 1:15 840
0
1000
2000
3000
4000
5000
.5
1
(Joins sheet 25)
(Joins inset, sheet 9)
(Joins sheet 33)
(Joins sheet 39)
2 110 000 FEET
740 000 FEET
730 000 FEET
2 095 000 FEET
R. 9 W.
R. 8 W.
T. 1 N.
T. 2 N.
L I C K I N G
H O P E W E L L
F A L L S
M U S K I N G U M
DILLON
RESERVOIR
APPROXIMATE FLOOD POOL LINE
water
146

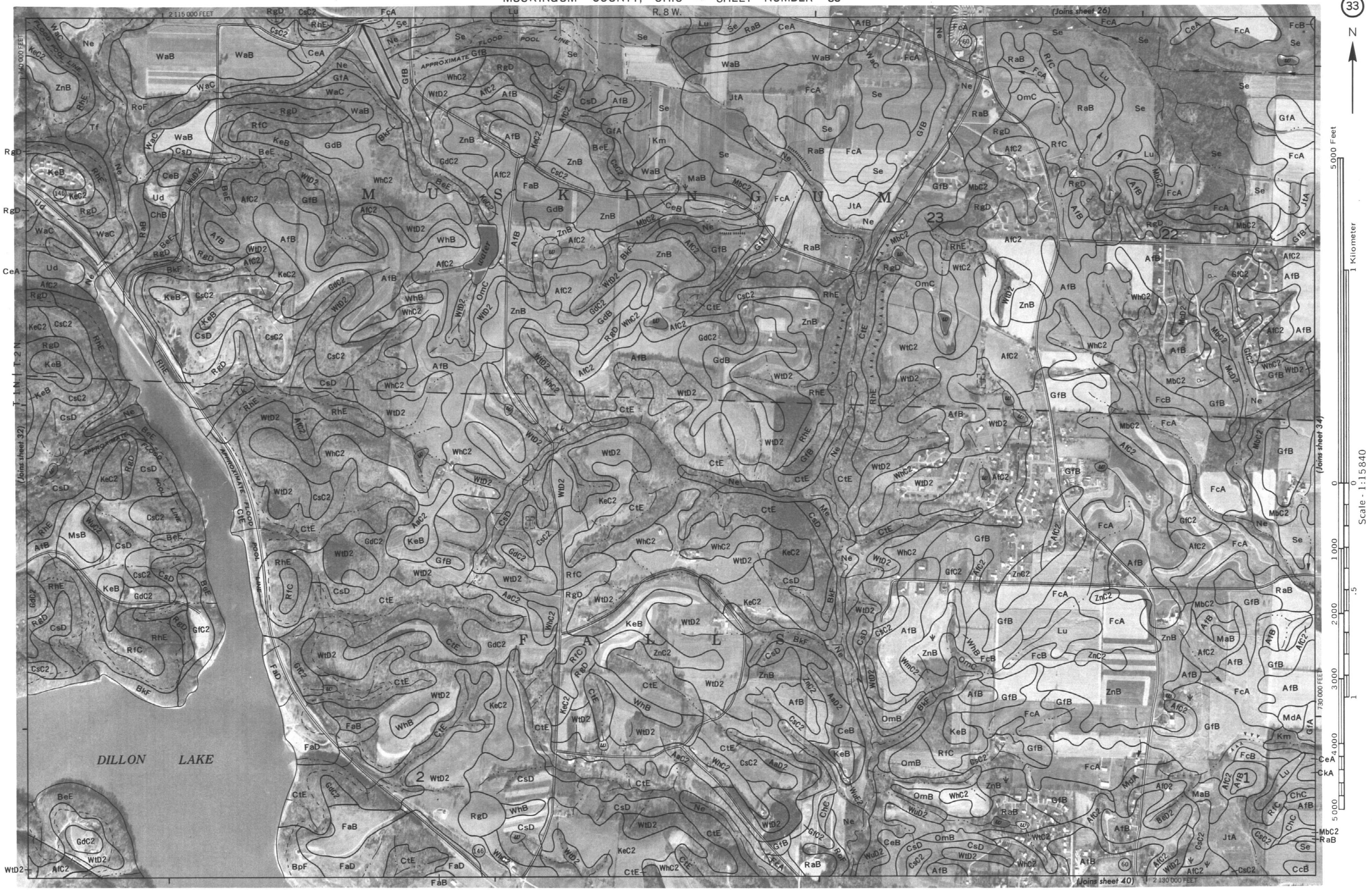
MUSKINGUM COUNTY, OHIO NO. 32

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MUSKINGUM COUNTY, OHIO — SHEET NUMBER 33

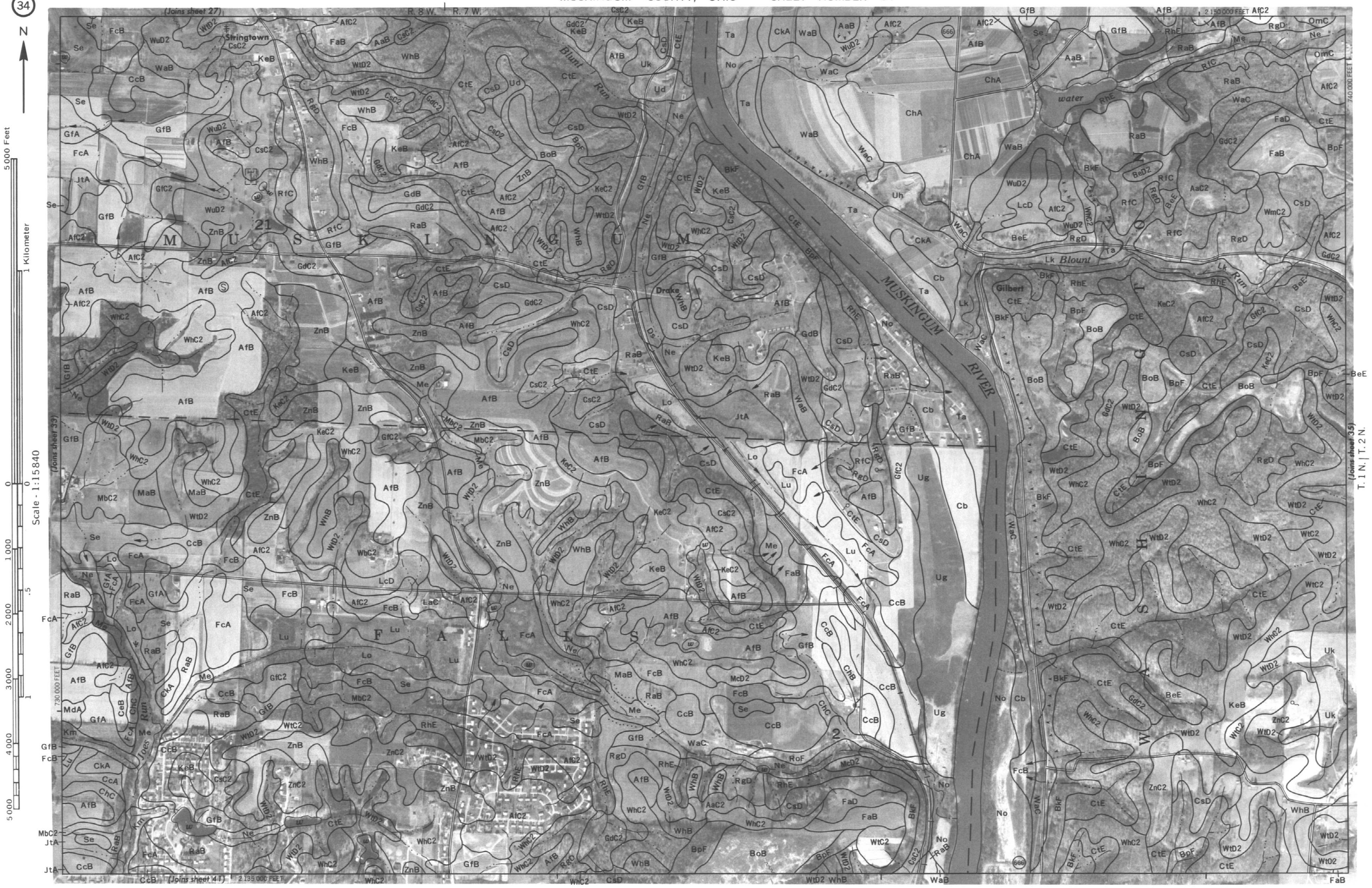
This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MUSKINGUM COUNTY, OHIO NO. 33



33
N
(Joins sheet 26)
(Joins sheet 32)
(Joins sheet 34)
(Joins sheet 40)
2 115 000 FEET
740 000 FEET
730 000 FEET
2 130 000 FEET
R. 8 W.
T. 1 N. | T. 2 N.
M U S K I N G U M
F A L L S
23
22
2
1
DILLON LAKE
APPROXIMATE FLOOD POOL LINE
water
60
146
5000 Feet
1 Kilometer
Scale - 1:15840
0
1 000
2 000
3 000
4 000
5 000
.5
1

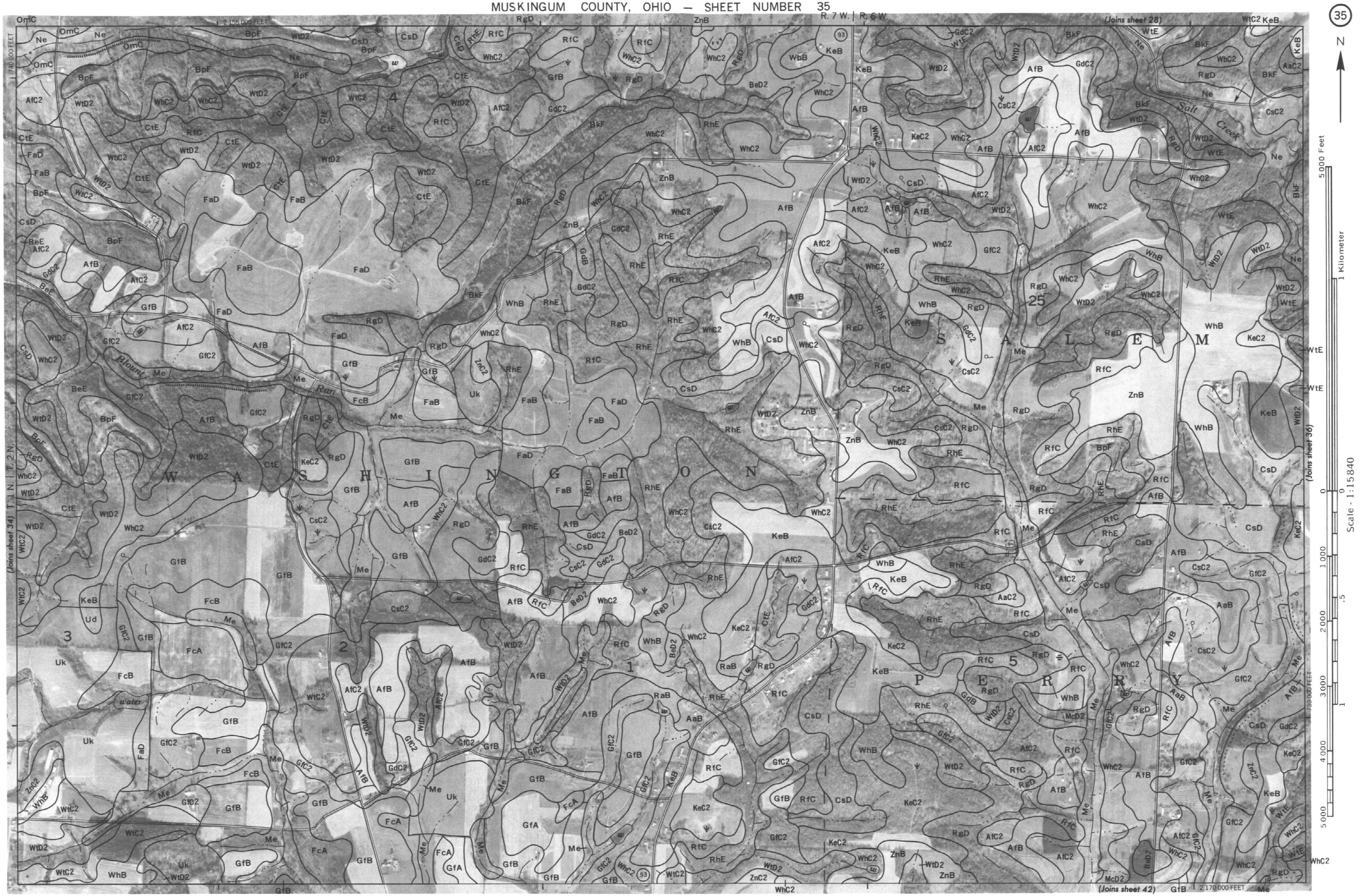
MUSKINGUM COUNTY, OHIO — SHEET NUMBER 34


N
5000 Feet
1 Kilometer
Scale - 1:15840
0
1000
2000
3000
4000
5000
0
.5
1
(Joins sheet 27)
R. 8 W.
R. 7 W.
Stringtown
Blunt Run
Drake
MUSKINGUM RIVER
water
Blount Run
Gilbert
M U S K I N G U M
F A L L S
W A S H I N G T O N
21
2
(Joins sheet 33)
(Joins sheet 35)
T. 1 N. | T. 2 N.
(Joins sheet 41)
2 135 000 FEET
2 150 000 FEET
740 000 FEET
730 000 FEET
Joes Run
666
Se
FcB
WuD2
WaB
CcB
KeB
GfA
FcA
JtA
GfB
AfC2
AfB
WhC2
MbC2
MaB
WtD2
CsC2
GfC2
RfC
ZnB
GdC2
FaB
AaB
WhB
CsD
CtE
Ud
Uk
Ne
Ta
No
CkA
ChA
Uh
WaC
BkF
BpF
BoB
GdB
RaB
Lo
Lu
JtA
Cb
Ug
CcB
ChB
ChC
FcA
Me
RhE
RgD
KeC2
LcD
LaC
BeE
BeD2
RfC
OmC
FaD
RaB
Lk
AaC2
McD2
RoF
WbC2
ZnC2
MdA
CeB
CcA
Km
WmC2
WtC2
Ds

MUSKINGUM COUNTY, OHIO NO. 34

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MUSKINGUM COUNTY, OHIO — SHEET NUMBER 35

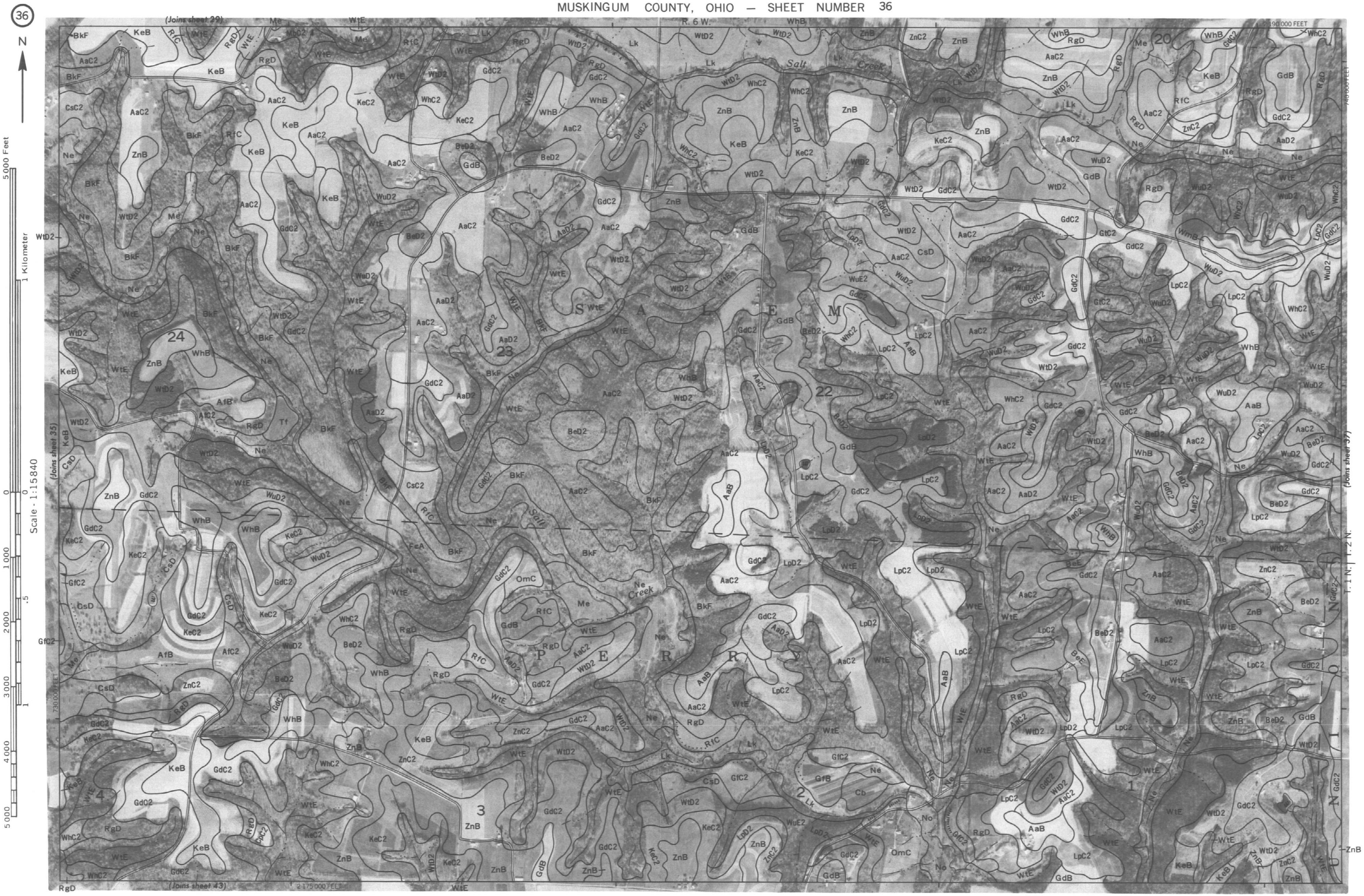


R. 7 W. | R. 6 W.
2 155 000 FEET
740 000 FEET
(Joins sheet 28)
(Joins sheet 34)
(Joins sheet 36)
(Joins sheet 42)
2 170 000 FEET
730 000 FEET
T. 1 N. | T. 2 N.
W A S H I N G T O N
S A L E M
P E R R Y
Blount Run
Salt Creek
water
93
1
2
3
4
5
25
N
5000 Feet
1 Kilometer
Scale - 1:15840
0
1000
2000
3000
4000
5000
.5
1

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

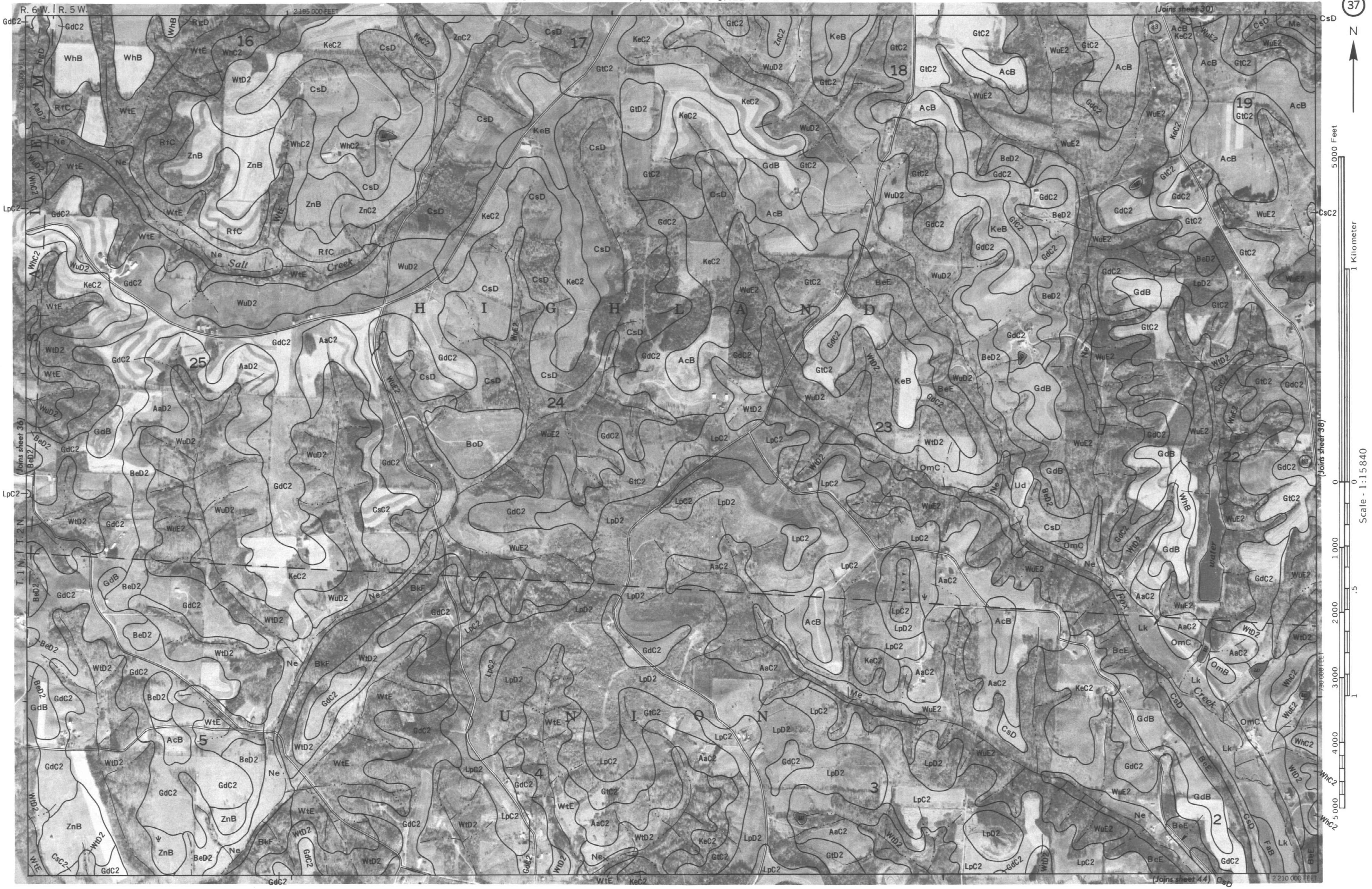
MUSKINGUM COUNTY, OHIO NO. 35

MUSKINGUM COUNTY, OHIO — SHEET NUMBER 36

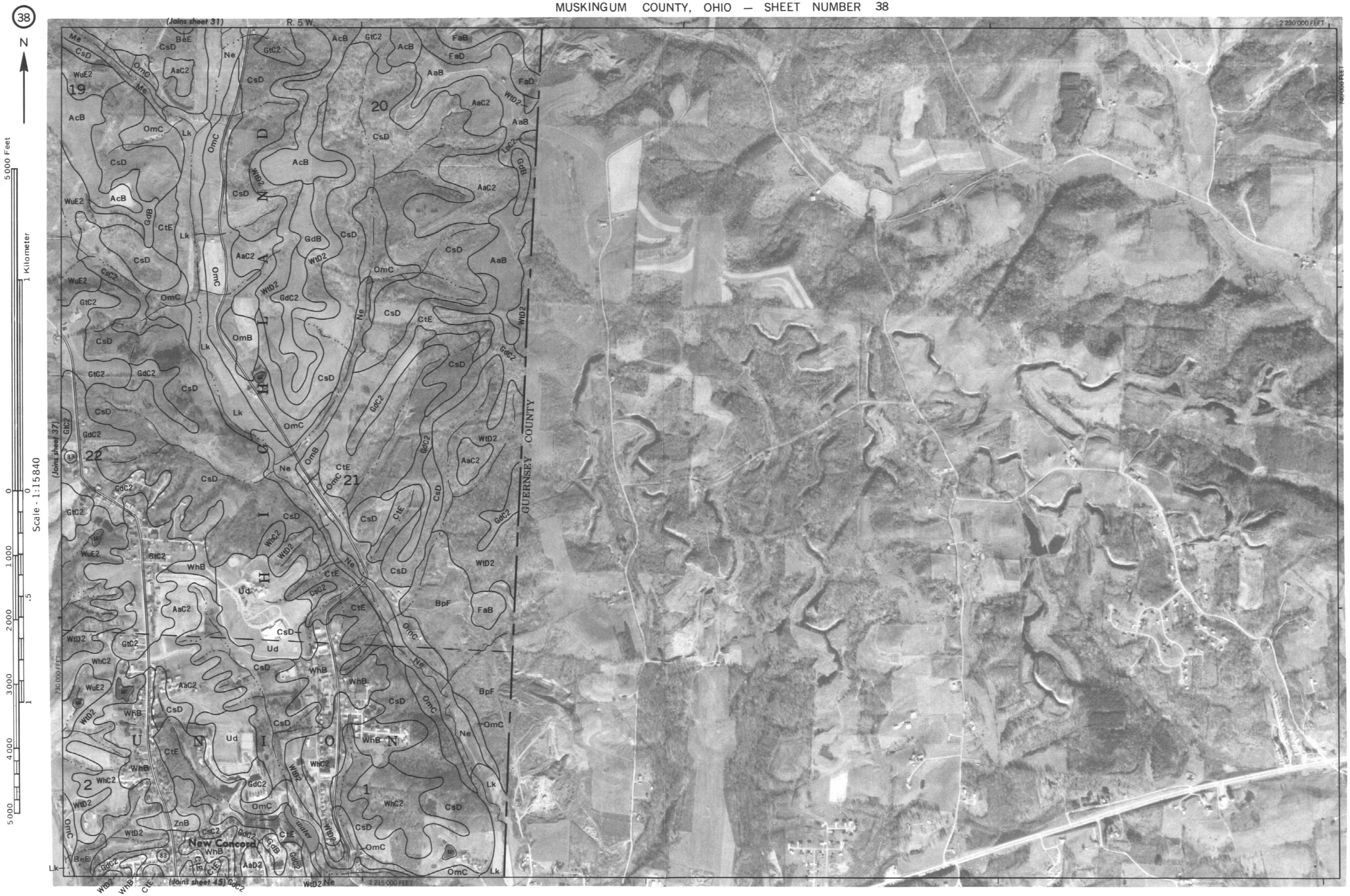

36
N
5 000 Feet
1 Kilometer
Scale - 1:15840
0
1 000
2000
3000
4000
5 000
0
.5
1
(Joins sheet 29)
(Joins sheet 35)
(Joins sheet 37)
(Joins sheet 43)
R. 6 W.
T. 2 N.
T. 1 N.
2 190 000 FEET
2 175 000 FEET
730 000 FEET
Salt Creek
Salt Creek
S A L E M
P E R R Y
U N I O N
20
21
22
23
24
1
2
3
4

MUSKINGUM COUNTY, OHIO NO. 36

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

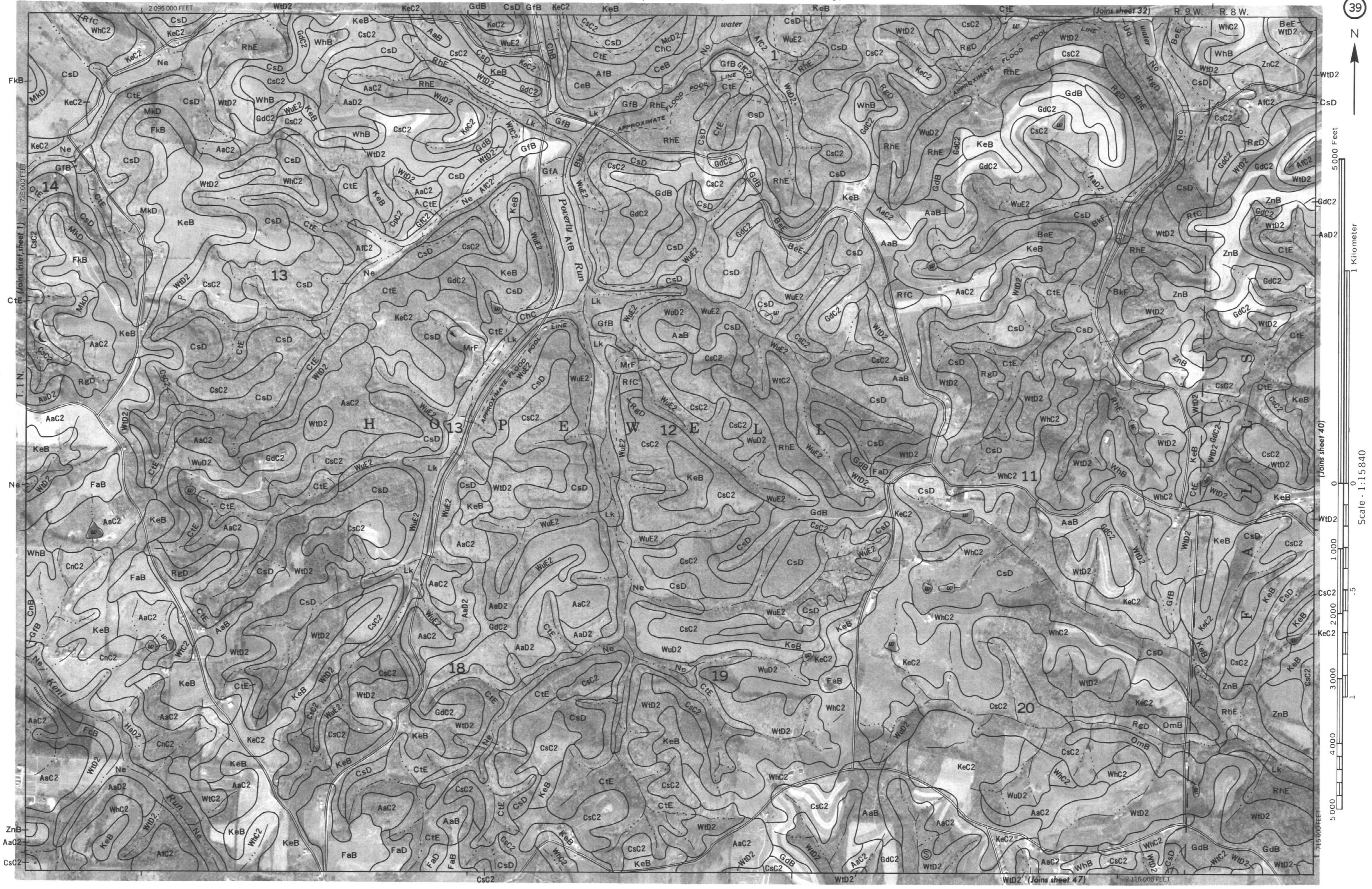

R. 6 W. | R. 5 W.
2 185 000 FEET
(Joins sheet 30)
(Joins sheet 36)
(Joins sheet 38)
(Joins sheet 44)
2 210 000 FEET
730 000 FEET
N
5 000 Feet
1 Kilometer
0
1 000
2 000
3 000
4 000
5 000
.5
1
Scale - 1:15840
T. 1 N. | T. 2 N.
H I G H L A N D
U N I O N
M E A D E
Salt Creek
Creek
Water
16
17
18
19
22
23
24
25
5
4
3
2
83
WhB
ReD
RfC
ZnB
WtD2
WhC2
KeC2
ZnC2
CsD
WtE
Ne
WuD2
GdC2
AaC2
AaD2
GdB
BeD2
WuE2
BoD
CsC2
LpC2
LpD2
GtC2
AcB
KeB
GtD2
BeE
OmC
Ud
Lk
OmB
BkF
Me
WtE
FaB
CsC2

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.


38
N
5000 Feet
1 Kilometer
Scale - 1:15840
0
1000
2000
3000
4000
5000
0
.5
1
(Joins sheet 31)
R. 5 W.
2 230 000 FEET
740 000 FEET
(Joins sheet 37)
730 000 FEET
(Joins sheet 45)
2 215 000 FEET
GUERNSEY COUNTY
H I G H L A N D
U N I O N
New Concord
19
20
21
22
2
1
83
Me
CsD
BeE
AaC2
Ne
GtC2
AcB
FaB
FaD
AaB
WuE2
OmC
WtD2
Lk
GdB
LpC2
CtE
CsC2
GdC2
OmB
WhC2
WhB
Ud
BpF
Ne
water
ZnB
AaD2
OmC
Lk

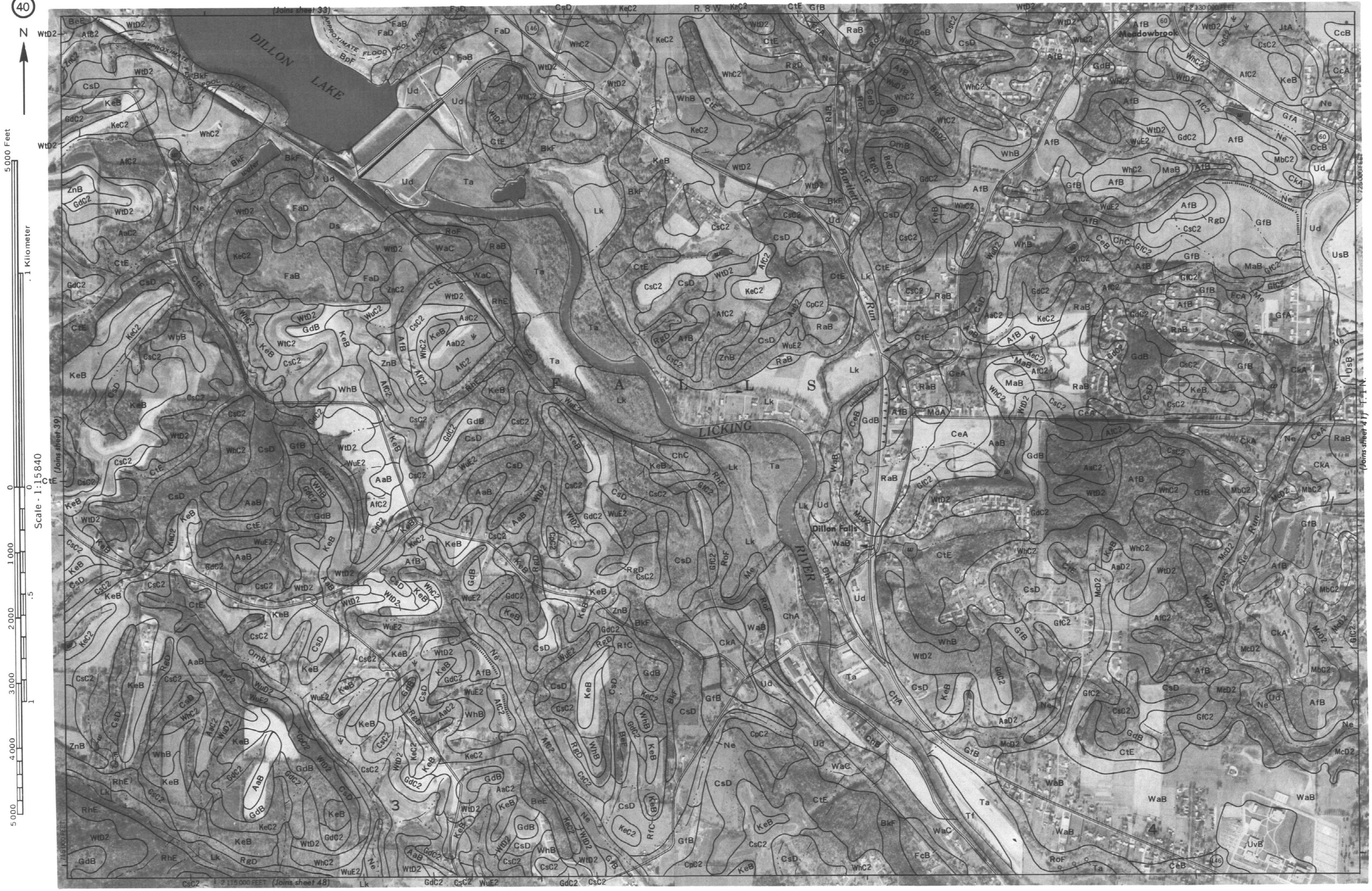
MUSKINGUM COUNTY, OHIO NO. 38

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.


39
N
(Joins sheet 32)
R. 9 W.
R. 8 W.
T. 1 N.
(Joins inset sheet 1)
(Joins sheet 40)
(Joins sheet 47)
2 095 000 FEET
725 000 FEET
2 110 000 FEET
715 000 FEET
H O P E W E L L
F A L L S
Poverty Run
Kent Run
APPROXIMATE FLOOD POOL LINE
water
14
13
12
11
1
18
19
20
5 000 Feet
1 Kilometer
0
1000
2000
3000
4000
5000
0
.5
1
Scale - 1:15840
FkB
KeC2
CtE
Ne
WtD2
CsD
GdC2
AaD2
CsC2
KeC2
ZnB
AaC2
GdB
KeB
RhE
WhC2
WuE2
AfB
Lk
MrF
RfC
CsC2

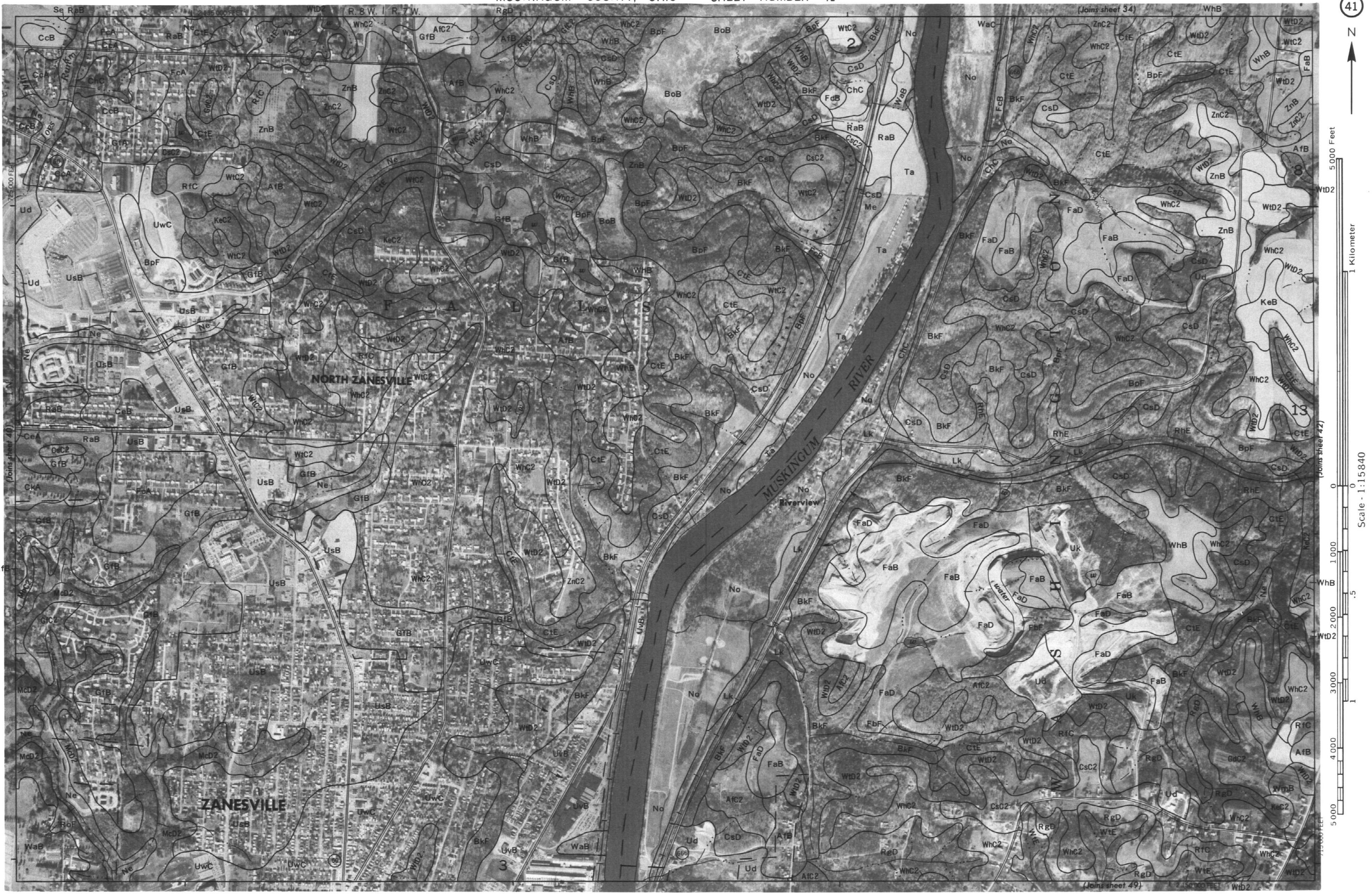
This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MUSKINGUM COUNTY, OHIO NO. 39


40
N
DILLON LAKE
APPROXIMATE FLOOD POOL LINE
(Joins sheet 33)
(Joins sheet 39)
(Joins sheet 41)
(Joins sheet 48)
R. 8 W.
T. 1 N.
Meadowbrook
Bartlett Run
F A L L S
LICKING RIVER
Dillon Falls
Jones Run
2 130 000 FEET
2 115 000 FEET
5000 Feet
1 Kilometer
Scale - 1:15 840
0
1000
2000
3000
4000
5 000
.5
1

MUSKINGUM COUNTY, OHIO NO. 40

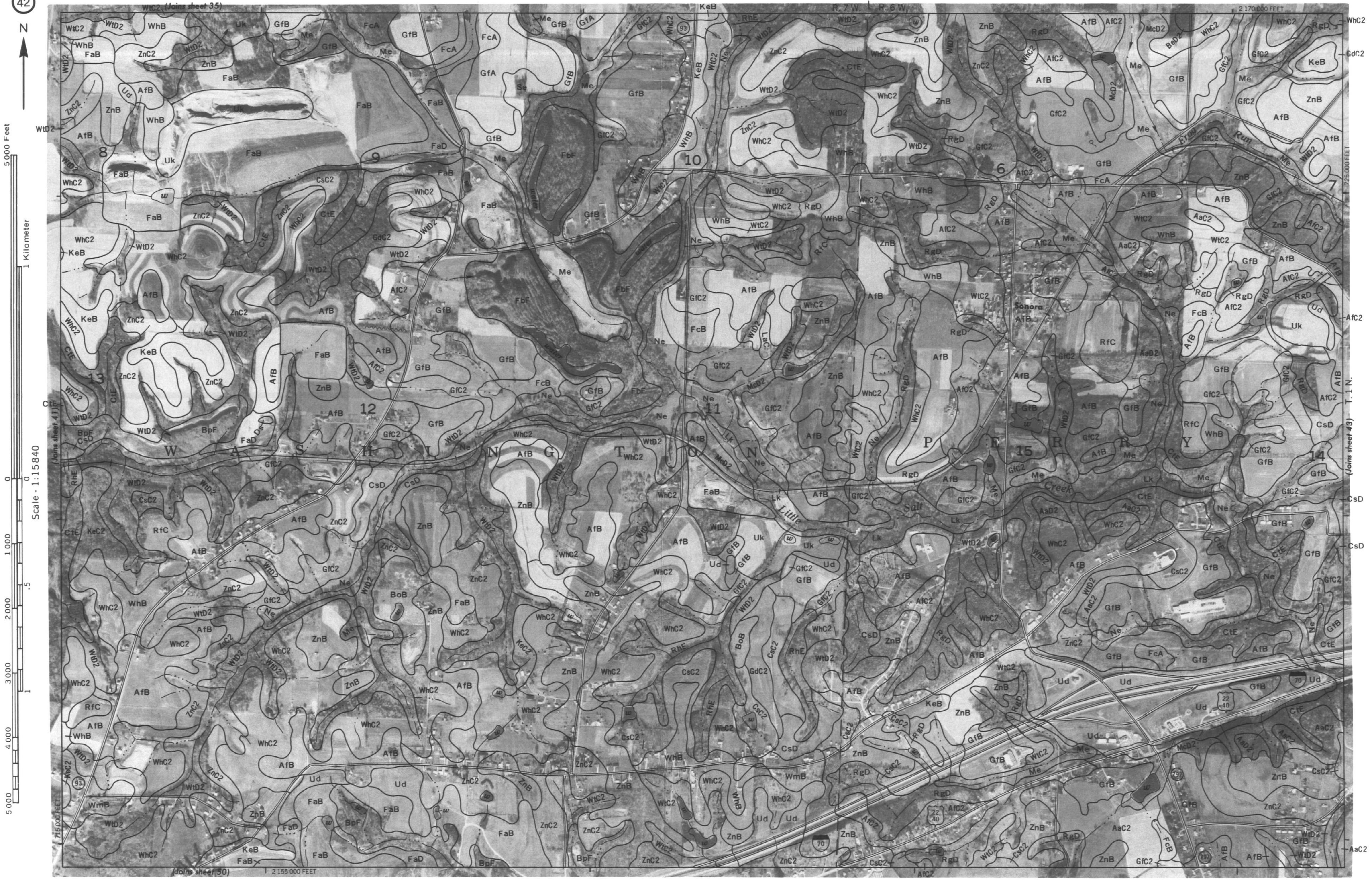
This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.


R. 8 W. | R. 7 W.
(Joins sheet 34)
(Joins sheet 40)
(Joins sheet 42)
(Joins sheet 49)
N
NORTH ZANESVILLE
ZANESVILLE
F A L L S
MUSKINGUM RIVER
Riverview
W A S H I N G T O N
2
3
8
13
666
60
water
5000 Feet
0
1000
2000
3000
4000
5000
1 Kilometer
.5
1
Scale - 1:15840

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

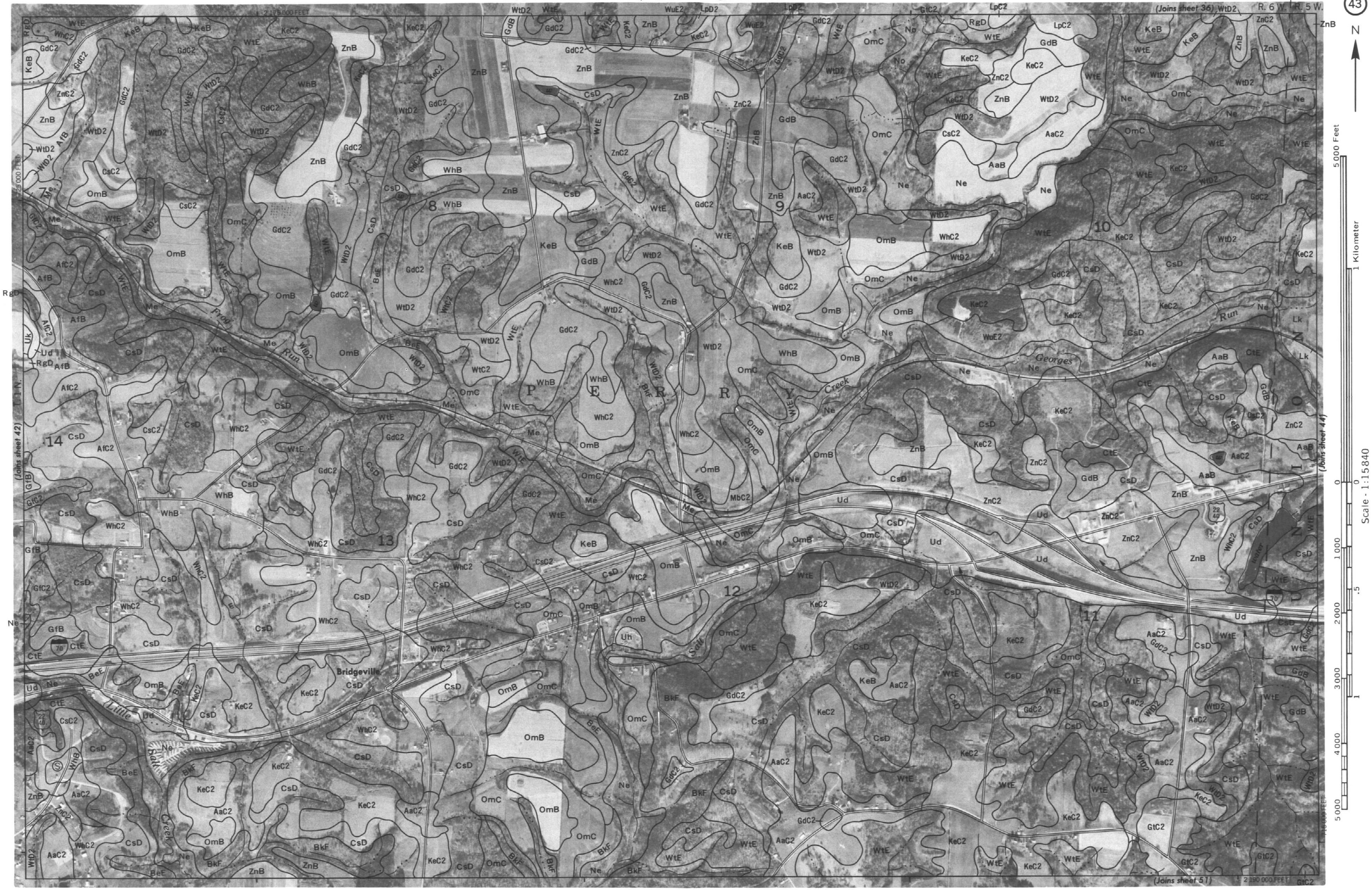
MUSKINGUM COUNTY, OHIO NO. 41

MUSKINGUM COUNTY, OHIO — SHEET NUMBER 42


N
5000 Feet
1 Kilometer
Scale - 1:15 840
0
1000
2000
3000
4000
5 000
0
.5
1
(Joins sheet 35)
(Joins sheet 41)
(Joins sheet 43)
(Joins sheet 50)
R. 7 W.
R. 6 W.
T. 1 N.
2 170 000 FEET
2 155 000 FEET
725 000 FEET
715 000 FEET
W A S H I N G T O N
P E R R Y
Sonora
Little Salt Creek
Frog Run
8
9
10
6
7
13
12
11
15
14
93
70
22
40

MUSKINGUM COUNTY, OHIO NO. 42

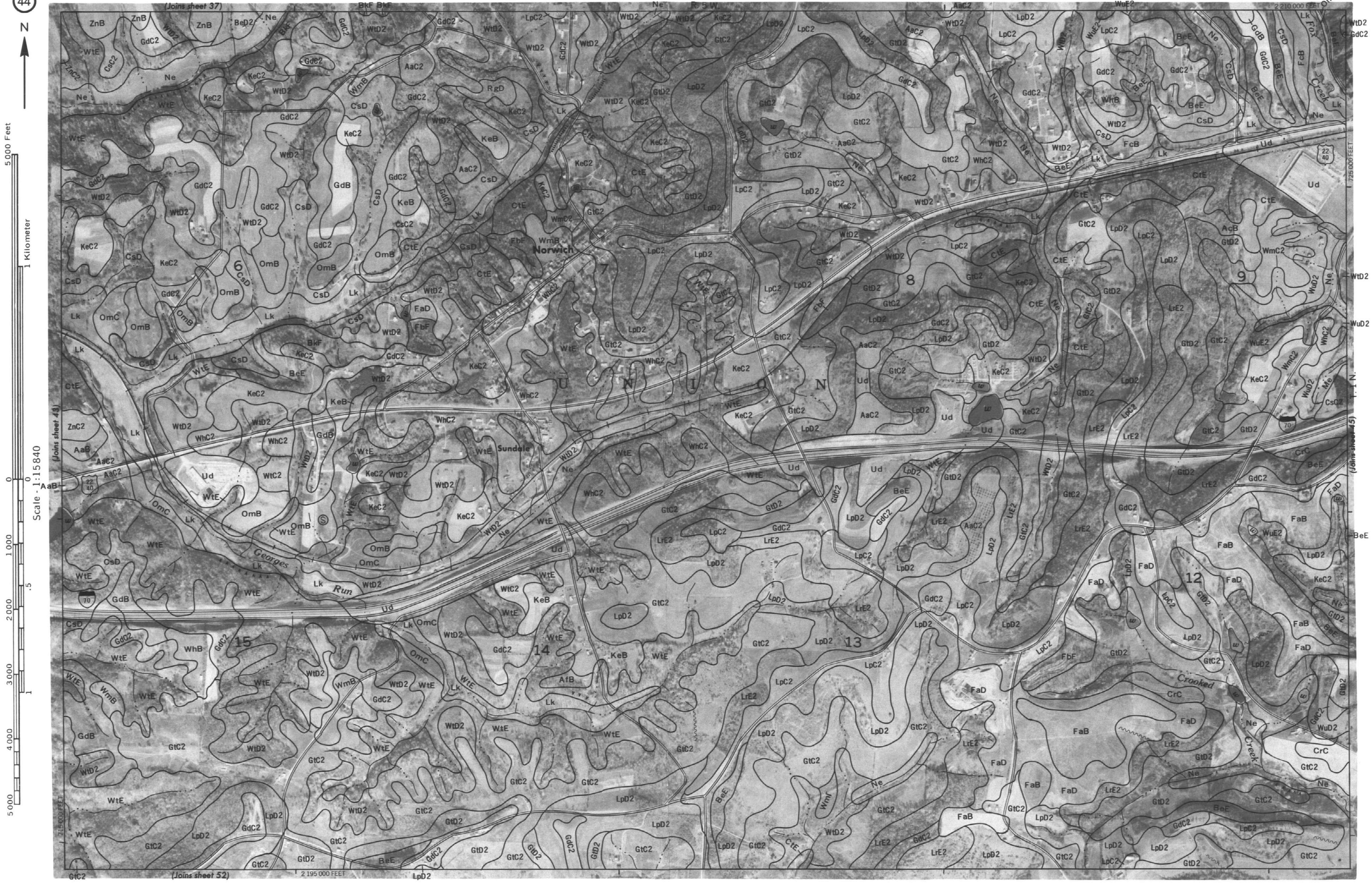
This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.


43
N
(Joins sheet 36)
(Joins sheet 42)
(Joins sheet 44)
(Joins sheet 51)
R. 6 W.
R. 5 W.
2 175 000 FEET
2 190 000 FEET
725 000 FEET
710 000 FEET
P E R R Y
U N I O N
L I N
Bridgeville
Frog Run
Georges Run
Creek
Little Salt Creek
Salt
Butler
7
8
9
10
11
12
13
14
70
22
40
5000 Feet
1 Kilometer
Scale - 1:15840
0
1000
2000
3000
4000
5000
.5
1

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MUSKINGUM COUNTY, OHIO NO. 43

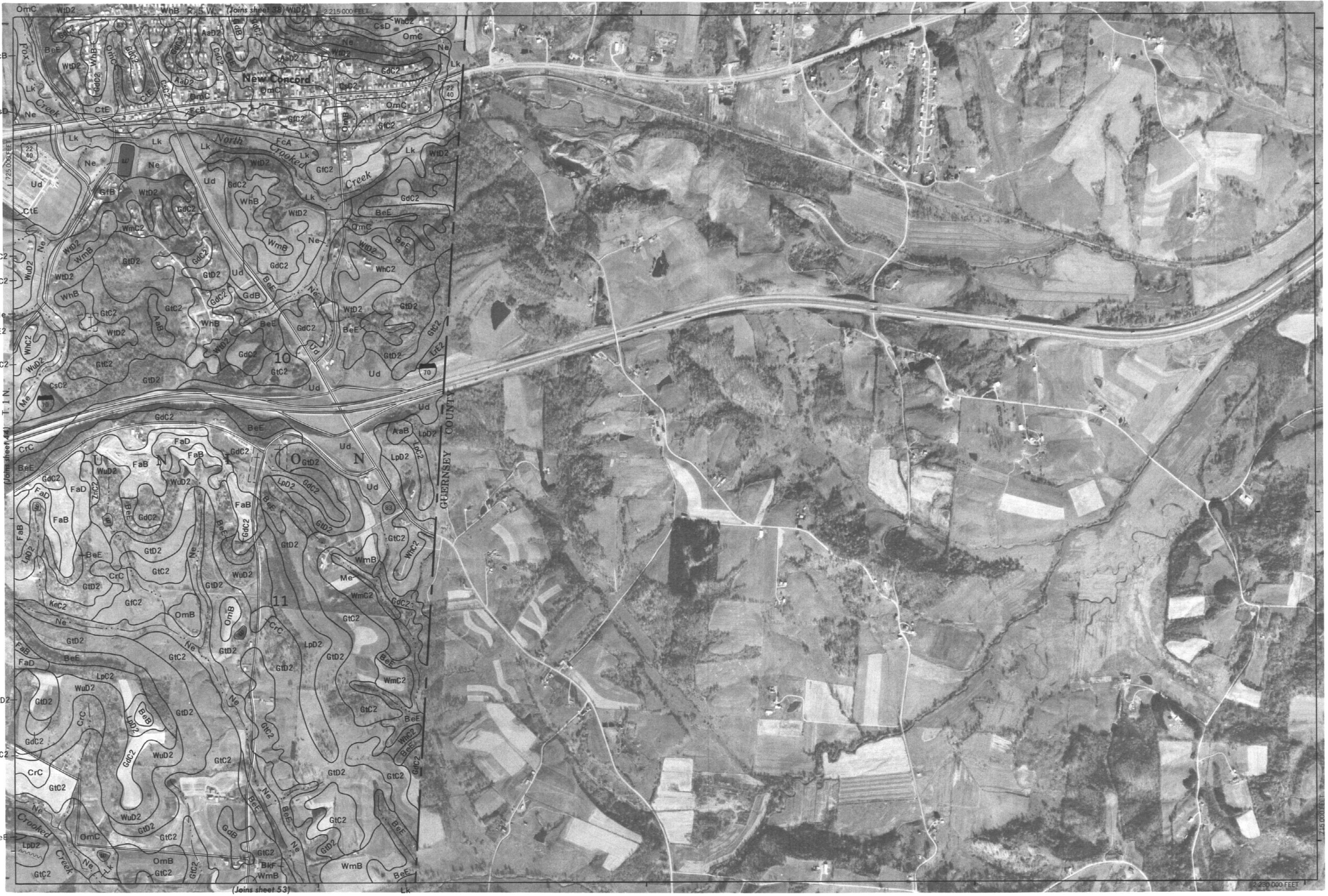
MUSKINGUM COUNTY, OHIO — SHEET NUMBER 44


44
N
(Joins sheet 37)
(Joins sheet 43)
(Joins sheet 45)
(Joins sheet 52)
R. 5 W.
T. 1 N.
2 210 000 FEET
2 195 000 FEET
725 000 FEET
710 000 FEET
Norwich
Sundale
U N I O N
Georges Run
Crooked Creek
Fox Creek
22 40
70
6
7
8
9
12
13
14
15
5 000 Feet
1 Kilometer
Scale - 1:15840
0
1000
2000
3000
4000
5000
.5
1

MUSKINGUM COUNTY, OHIO NO. 44

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MUSKINGUM COUNTY, OHIO — SHEET NUMBER 45

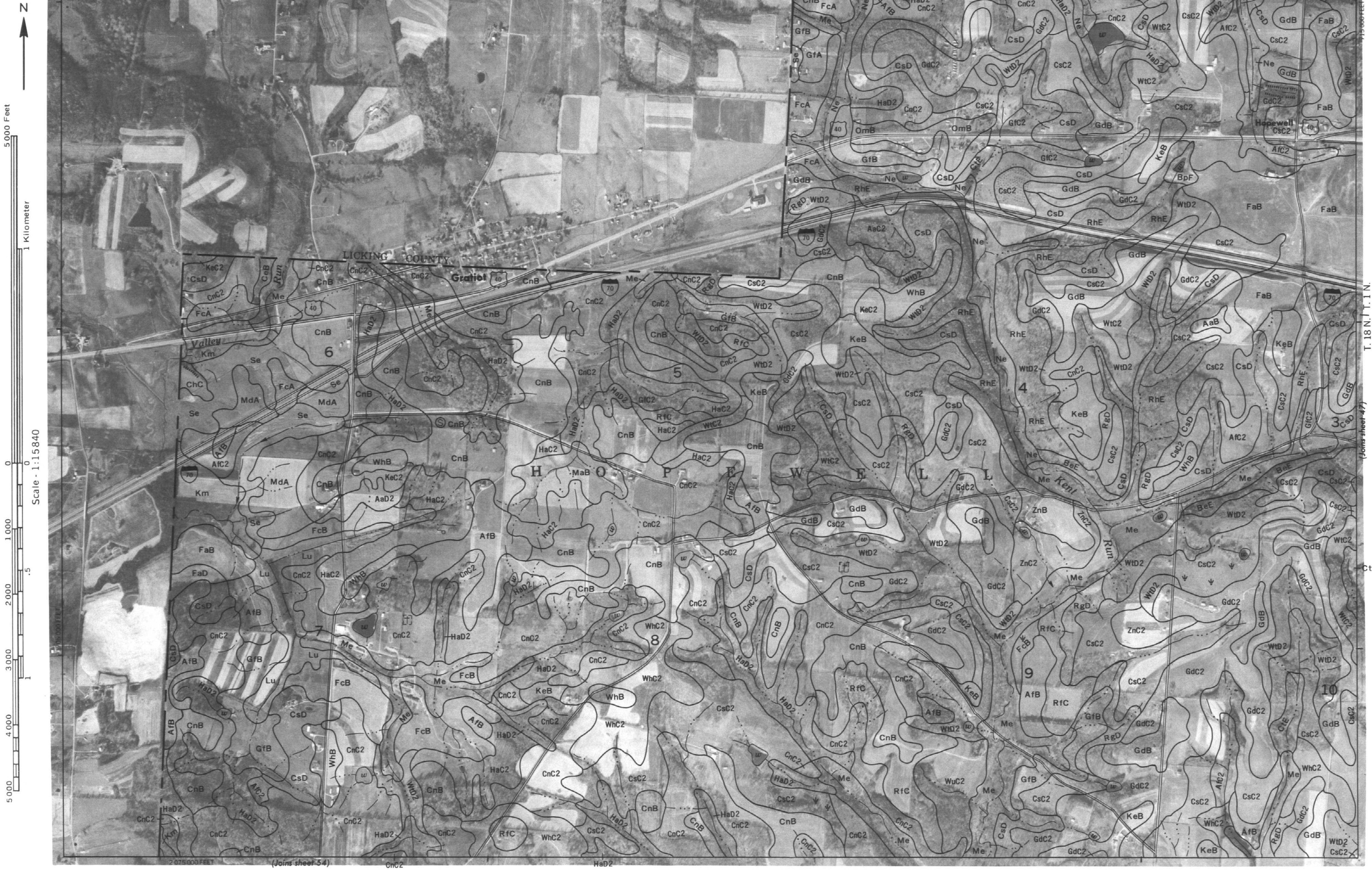

OmC
WhB R. 5 W.
(Joins sheet 38)
2 215 000 FEET
New Concord
North Crooked Creek
Creek
22 40
83
70
10
11
T. 1 N.
(Joins sheet 44)
U N I O N
GUERNSEY COUNTY
Crooked Creek
(Joins sheet 53)
725 000 FEET
715 000 FEET
2 230 000 FEET
FcB
CsD
WmC2
Ne
WuE2
GtC2
GtD2
BeE
N

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MUSKINGUM COUNTY, OHIO NO. 45

5000 Feet
1 Kilometer
0
1000
2000
3000
4000
5000
0
.5
1
Scale - 1:15840

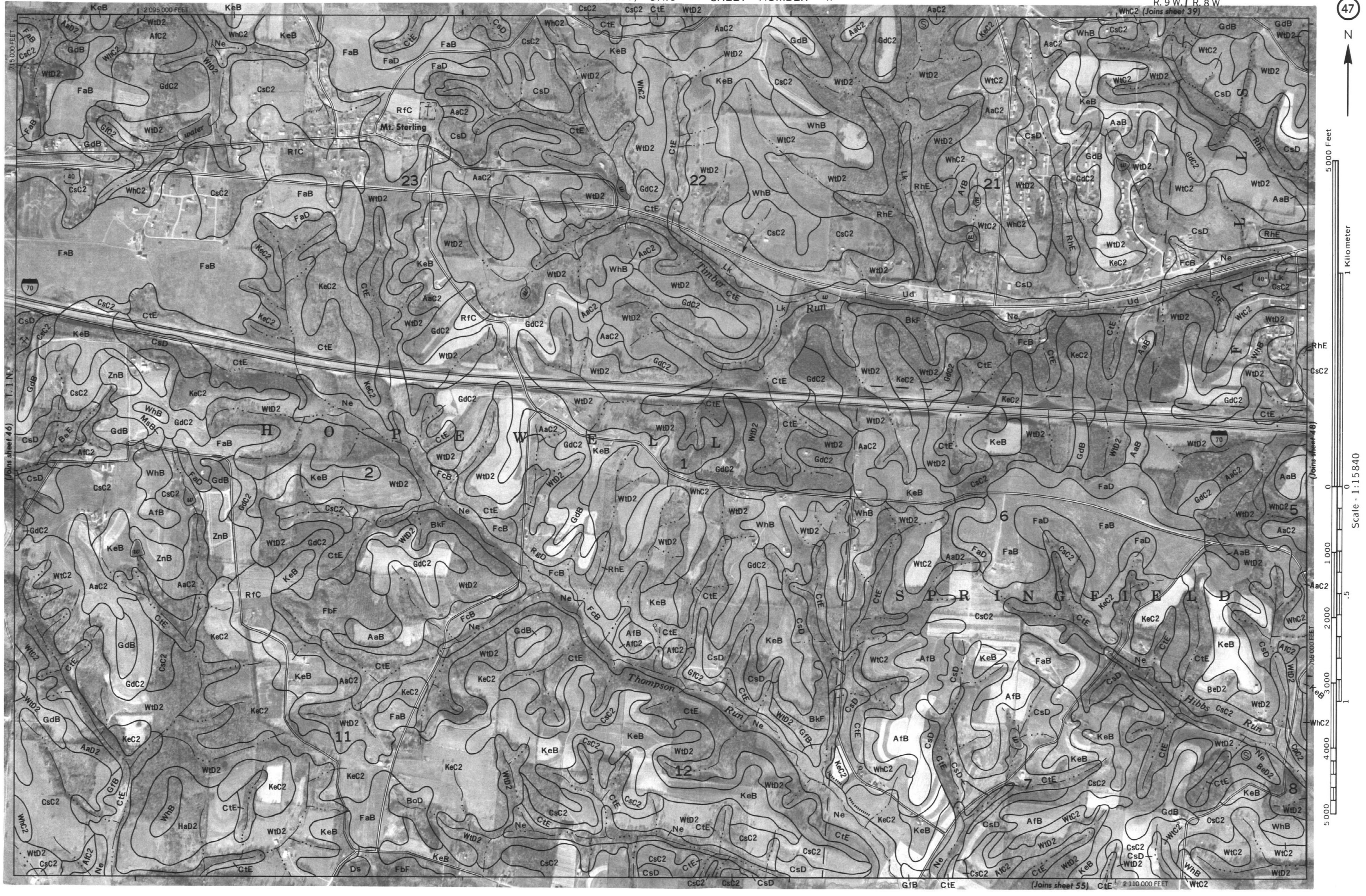
MUSKINGUM COUNTY, OHIO — SHEET NUMBER 46


N
5 000 Feet
1 Kilometer
Scale - 1:15840
0
1000
2000
3000
4000
5 000
.5
1
(Joins inset, sheet 1)
R. 9 W.
2 090 000 FEET
2 075 000 FEET
(Joins sheet 54)
(Joins sheet 47)
T. 18 N. | T. 1 N.
LICKING COUNTY
Gratiot
Hopewell
H O P E W E L L
Valley
Run
Kent
Run
40
70
1
2
3
4
5
6
7
8
9
10

MUSKINGUM COUNTY, OHIO NO. 46

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

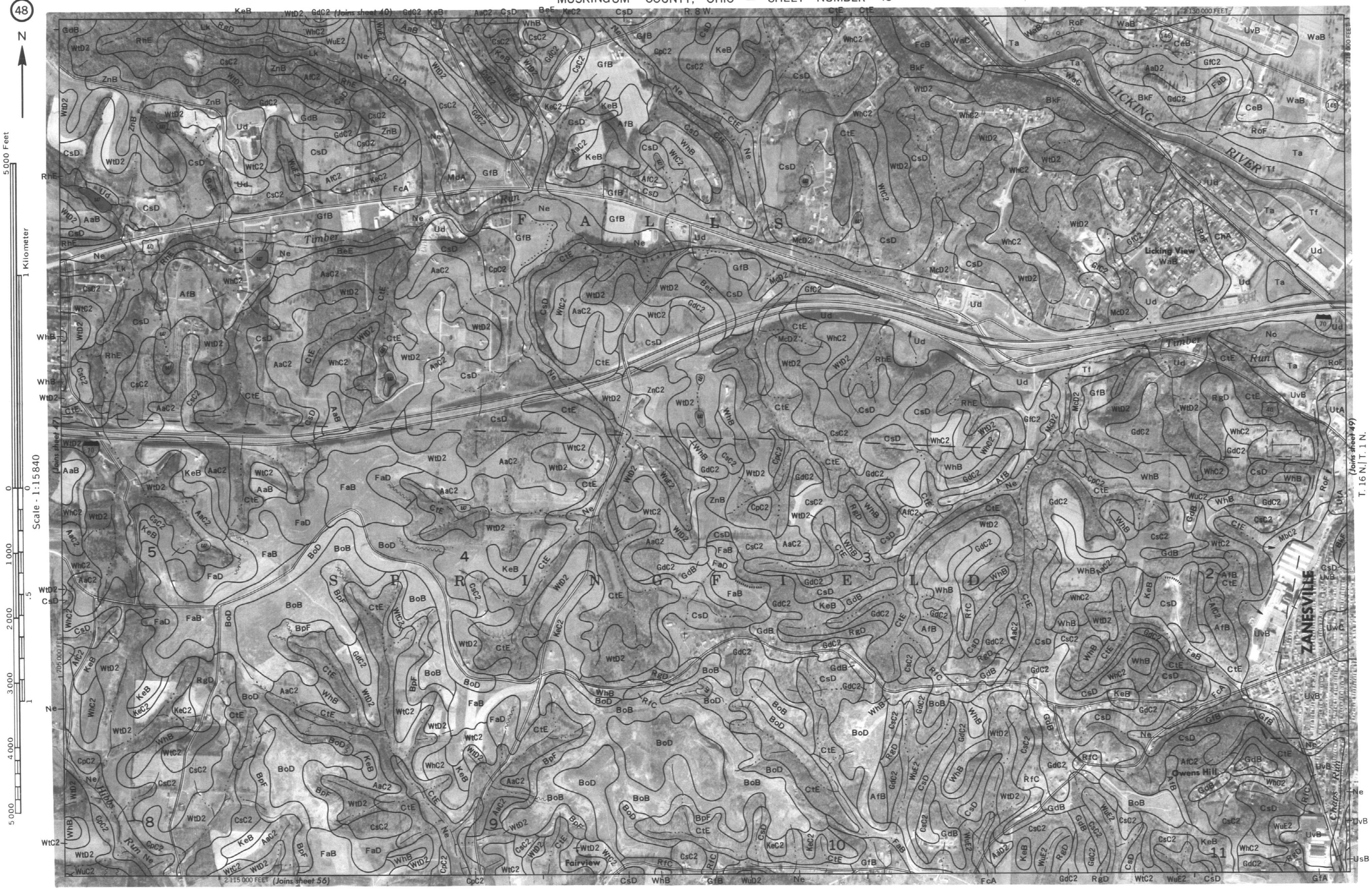
MUSKINGUM COUNTY, OHIO — SHEET NUMBER 47


R. 9 W. | R. 8 W.
WhC2 (Joins sheet 39)
2 095 000 FEET
715 000 FEET
Mt. Sterling
Timber Run
Thompson Run
Hibbs Run
water
HOPEWELL
SPRINGFIELD
FALLS
T. 1 N.
(Joins sheet 46)
(Joins sheet 48)
(Joins sheet 55)
2 110 000 FEET
700 000 FEET
40
70
23
22
21
1
2
5
6
7
8
11
12
N
5 000 Feet
1 Kilometer
Scale - 1:15 840
0
1000
2000
3000
4000
5000
.5
1

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MUSKINGUM COUNTY, OHIO NO. 47

MUSKINGUM COUNTY, OHIO — SHEET NUMBER 48


48
N
5 000 Feet
1 Kilometer
Scale - 1:15840
0
1000
2000
3000
4000
5000
0
.5
1
R. 8 W.
2 130 000 FEET
705 000 FEET
2 115 000 FEET
(Joins sheet 40)
(Joins sheet 47)
(Joins sheet 49)
(Joins sheet 56)
T. 16 N.
T. 1 N.
LICKING RIVER
F A L L S
S P R I N G F I E L D
ZANESVILLE
Licking View
Owens Hill
Fairview
Timber Run
Hibbs Run
Chaps Run
40
70
146
2
3
4
5
8
9
10
11

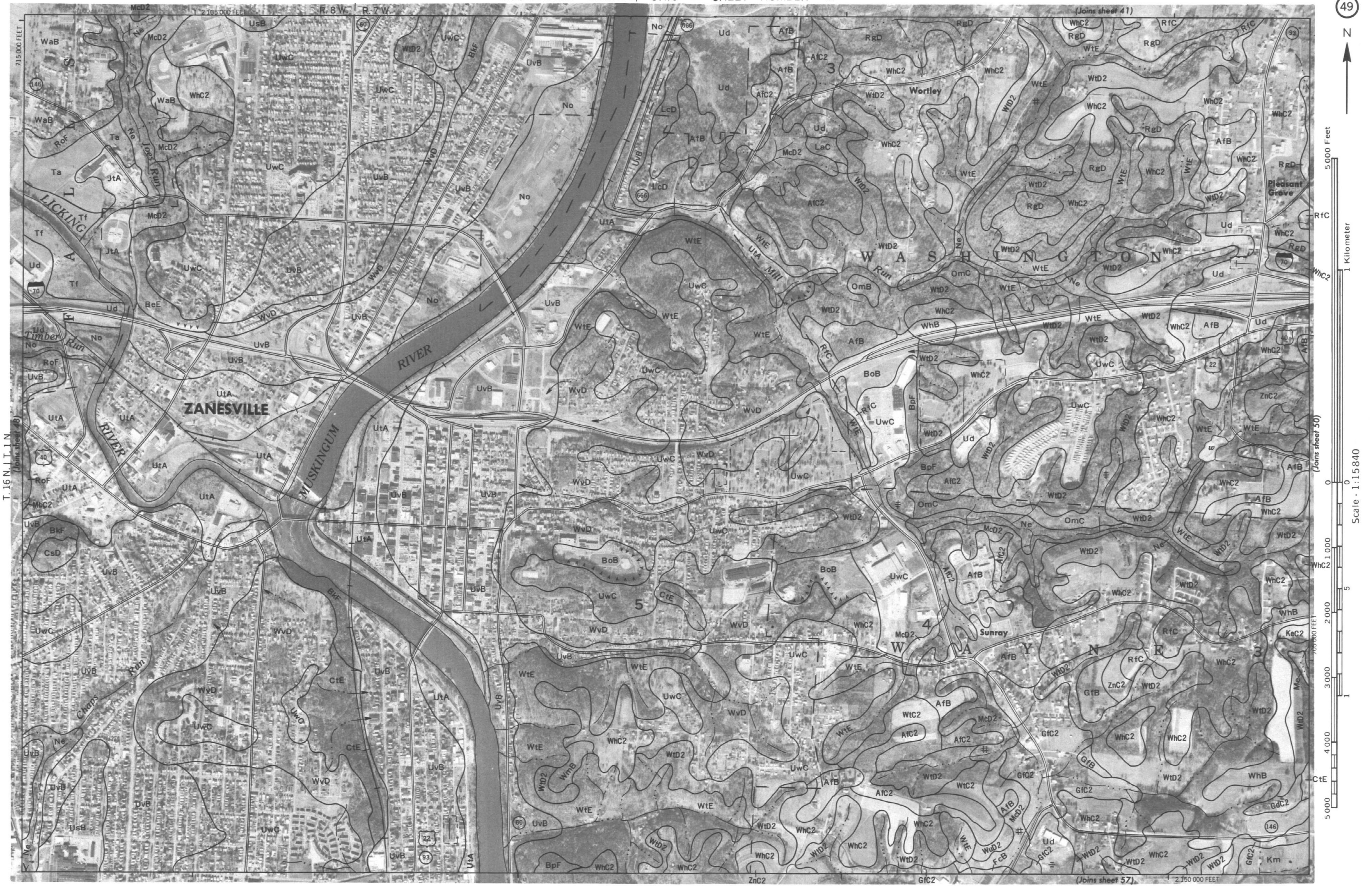
MUSKINGUM COUNTY, OHIO NO. 48

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MUSKINGUM COUNTY, OHIO — SHEET NUMBER 49

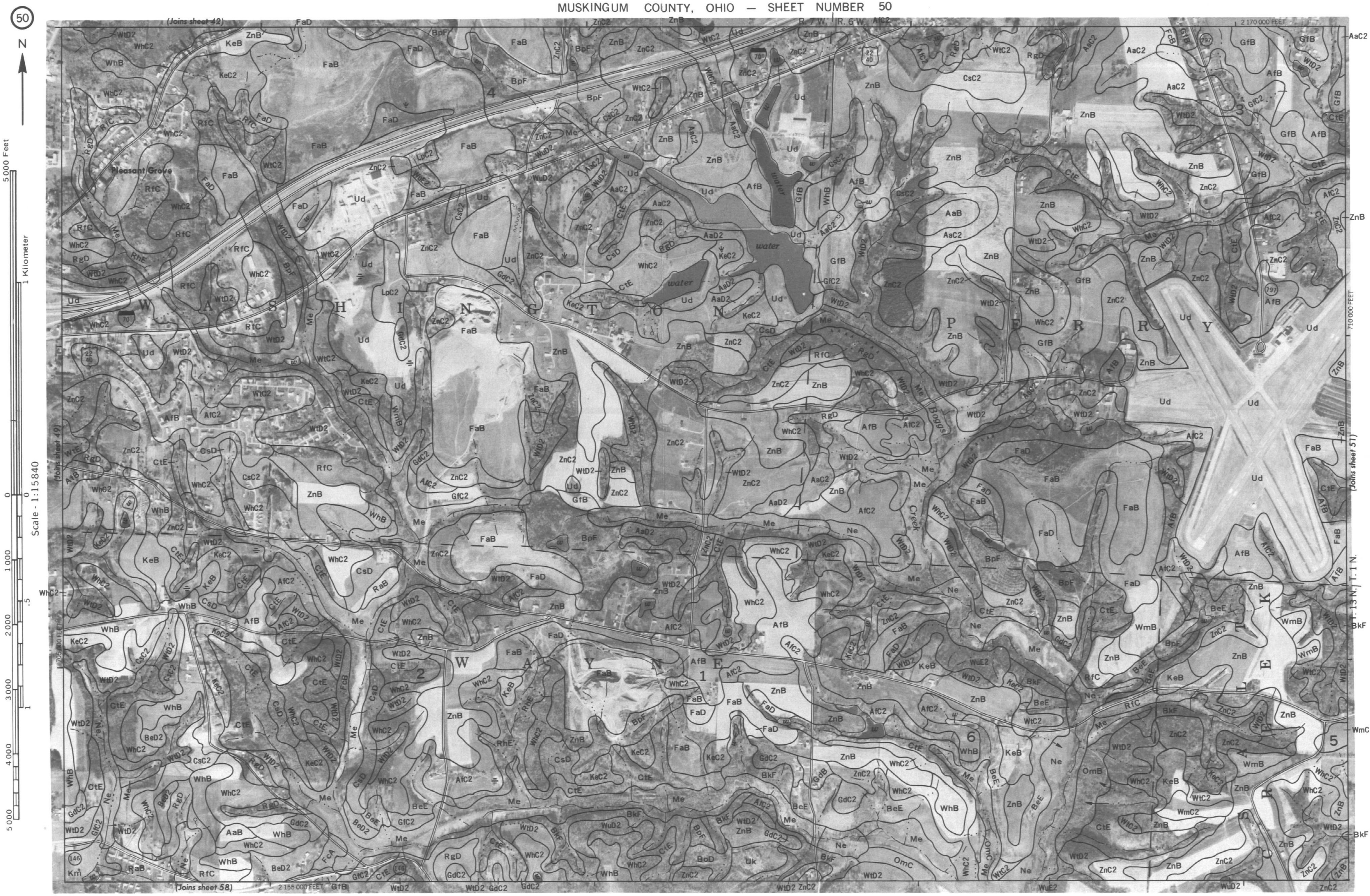
This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MUSKINGUM COUNTY, OHIO NO. 49



49
N
(Joins sheet 41)
(Joins sheet 48)
(Joins sheet 50)
(Joins sheet 57)
2 185 000 FEET
2 150 000 FEET
715 000 FEET
705 000 FEET
R. 8 W.
R. 7 W.
T. 16 N. | T. 1 N.
ZANESVILLE
MUSKINGUM RIVER
LICKING RIVER
Joes Run
Timber Run
Chaps Run
Mill Run
WASHINGTON
WAYNE
Wortley
Pleasant Grove
Sunray
3
4
5
60
666
146
70
40
22
93
UsB
UwC
UvB
WtD2
BkF
No
Ud
AfB
AfC2
RgD
WhC2
WtE
RfC
McD2
Ne
WaB
Ta
JtA
Tf
RoF
LcD
LaC
UtA
WvD
BeE
OmB
OmC
BoB
BpF
WhB
ZnC2
CsD
CtE
KeC2
GfB
GfC2
WtC2
WmB
FcB
GdC2
Km
Me
w
5 000 Feet
1 Kilometer
0
1 000
2 000
3 000
4 000
5 000
5
1
Scale - 1:15840

MUSKINGUM COUNTY, OHIO — SHEET NUMBER 50



50
N
(Joins sheet 42)
(Joins sheet 49)
(Joins sheet 51)
(Joins sheet 58)
R. 7 W. | R. 6 W.
T. 13 N. | T. 1 N.
2 170 000 FEET
2 155 000 FEET
710 000 FEET
705 000 FEET
5000 Feet
1 Kilometer
Scale 1:15 840
0
1000
2000
3000
4000
5000
.5
1
Pleasant Grove
WASHINGTON
PERRY
WAYNE
CREEK
SALT
Boggs Creek
water
70
22
40
797
146
AaC2
BkF
WmC2
ZnB

MUSKINGUM COUNTY, OHIO NO. 50

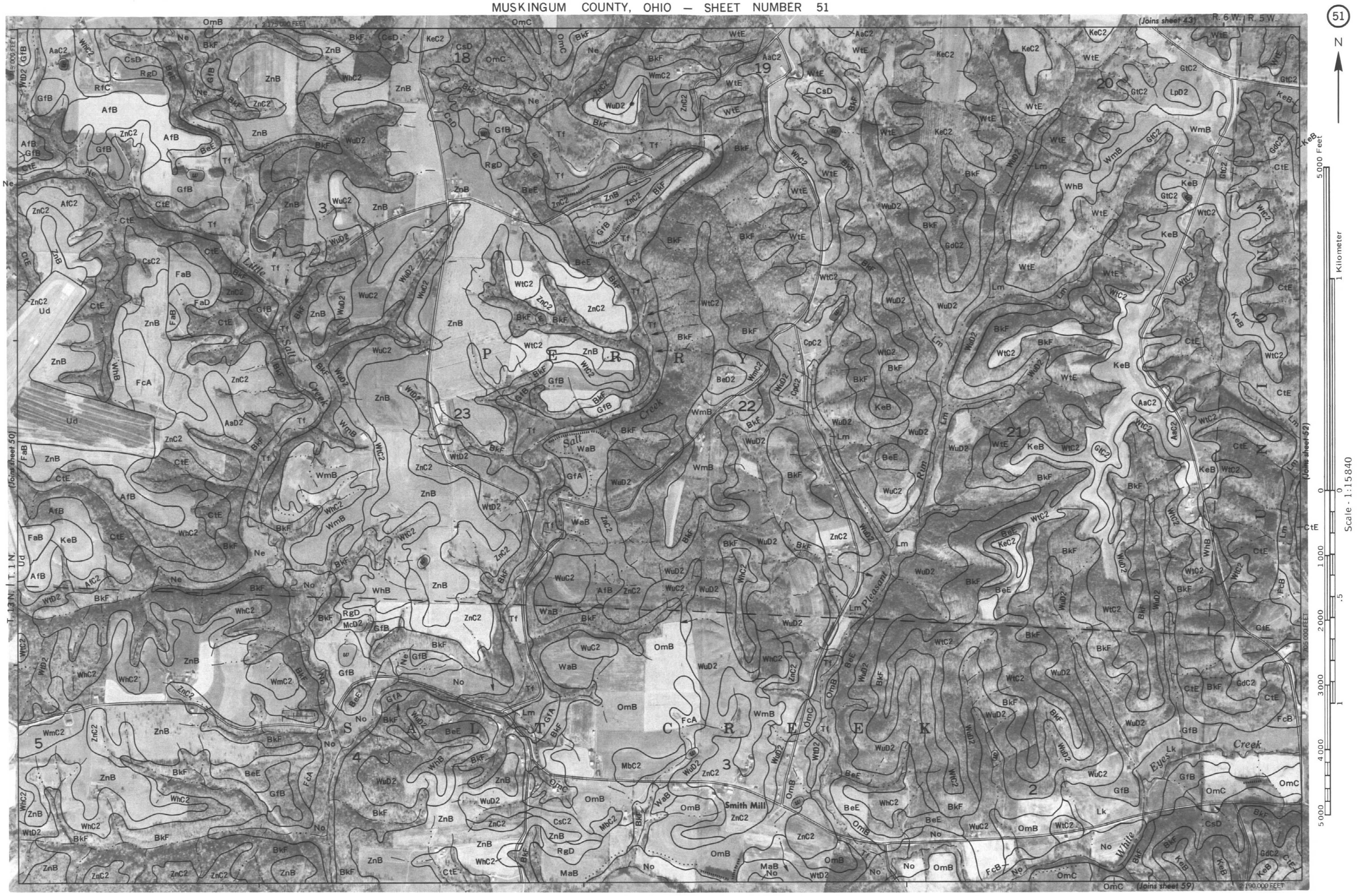
This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MUSKINGUM COUNTY, OHIO — SHEET NUMBER 51

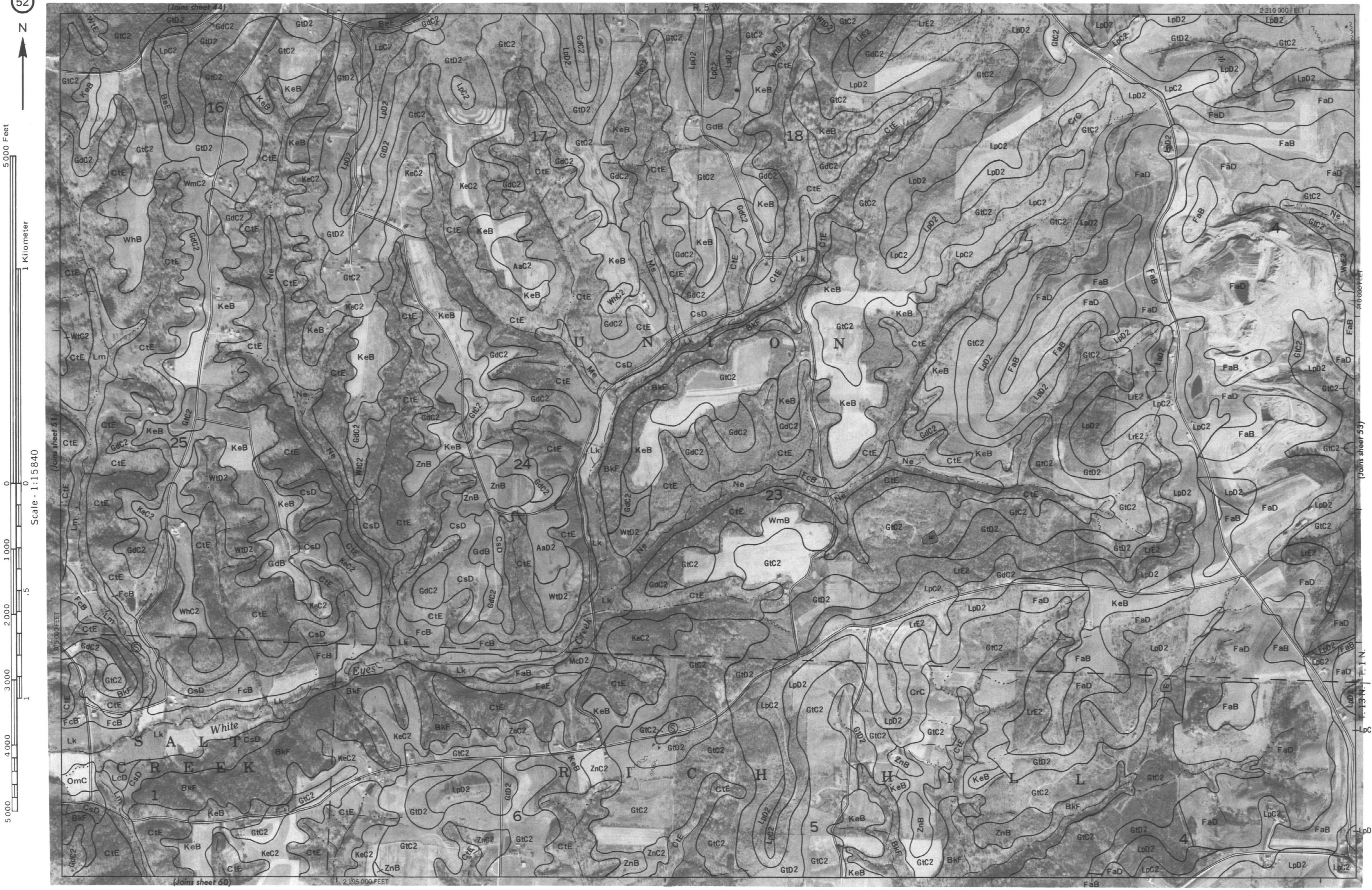
(51)

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MUSKINGUM COUNTY, OHIO NO. 51


(Joins sheet 43)
R. 6 W. | R. 5 W.
N
2 175 000 FEET
690 000 FEET
(Joins sheet 50)
(Joins sheet 52)
(Joins sheet 59)
2 190 000 FEET
705 000 FEET
T. 13 N. | T. 1 N.
5000 Feet
1 Kilometer
Scale - 1:15 840
0
1000
2000
3000
4000
5000
.5
1
P E R R Y
S A L T C R E E K
M U S K I N G U M
Little Salt Creek
Salt Creek
Salt
Pleasant Run
White Eyes Creek
Smith Mill
18
19
20
3
23
22
21
5
4
3
2
OmB
OmC
BkF
CsD
KeC2
Ne
WtE
AaC2
GfB
WhC2
RgD
CsD
ZnB
ZnC2
RfC
AfB
AfC2
CtE
Tf
WuD2
WuC2
WmC2
WmB
WtC2
WtD2
CsC2
FaB
FaD
FcA
FcB
Ud
WhB
AaD2
KeB
BeE
BeD2
GfA
WaB
No
McD2
MbC2
MaB
MaB
Lm
Lk
GtC2
GdC2
GdC2
LpD2
CpC2
WmC2
KeC2

MUSKINGUM COUNTY, OHIO — SHEET NUMBER 52

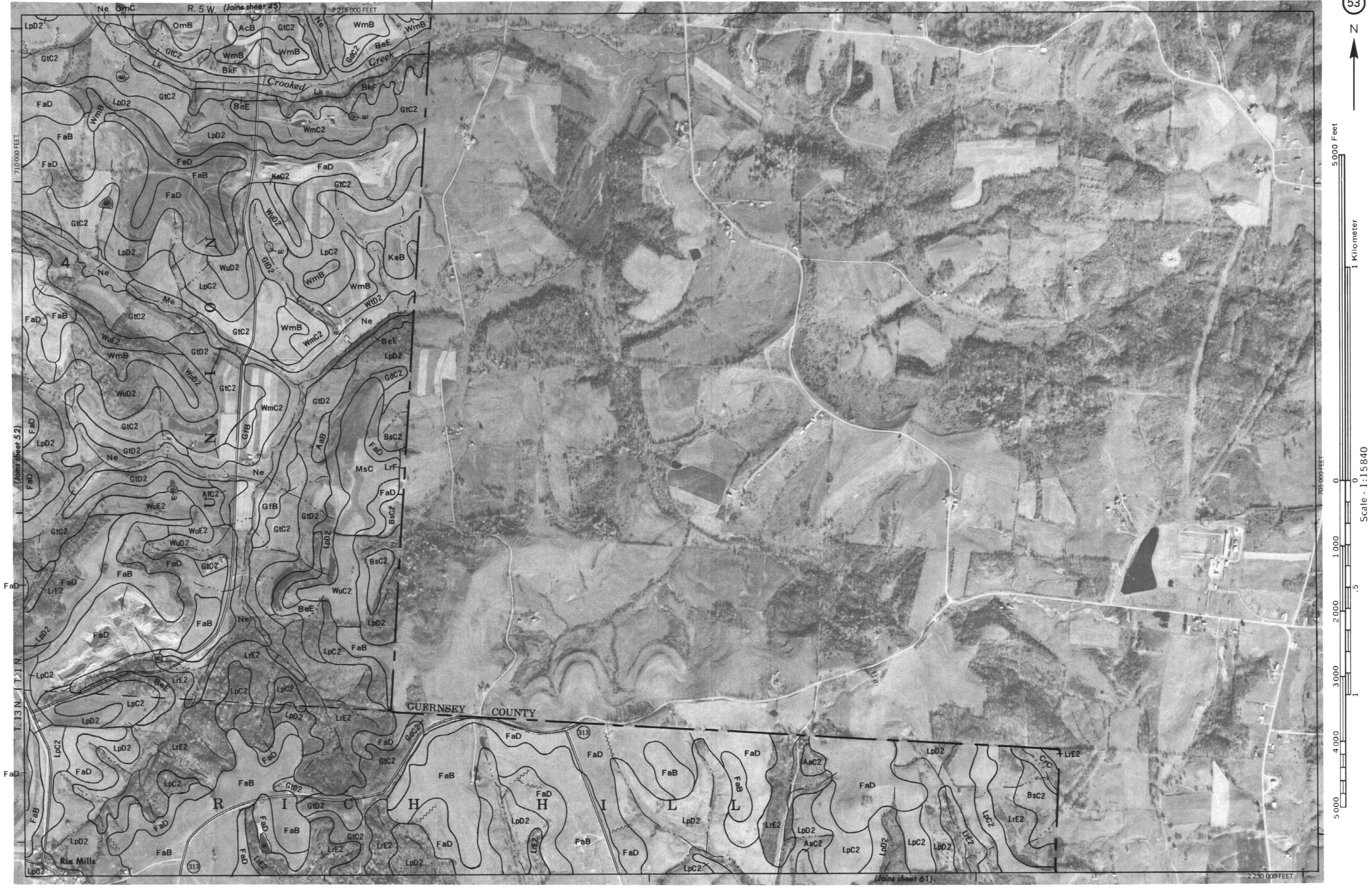

N
5 000 Feet
1 Kilometer
Scale - 1:15 840
0
1000
2000
3000
4000
5 000
0
.5
1
(Joins sheet 44)
R. 5 W.
2 210 000 FEET
(Joins sheet 51)
(Joins sheet 53)
(Joins sheet 60)
2 195 000 FEET
740 000 FEET
730 000 FEET
T. 1 N.
T. 13 N.
U N I O N
S A L T C R E E K
R I C H H I L L
White Eyes Creek
16
17
18
25
24
23
4
1
6
5
4

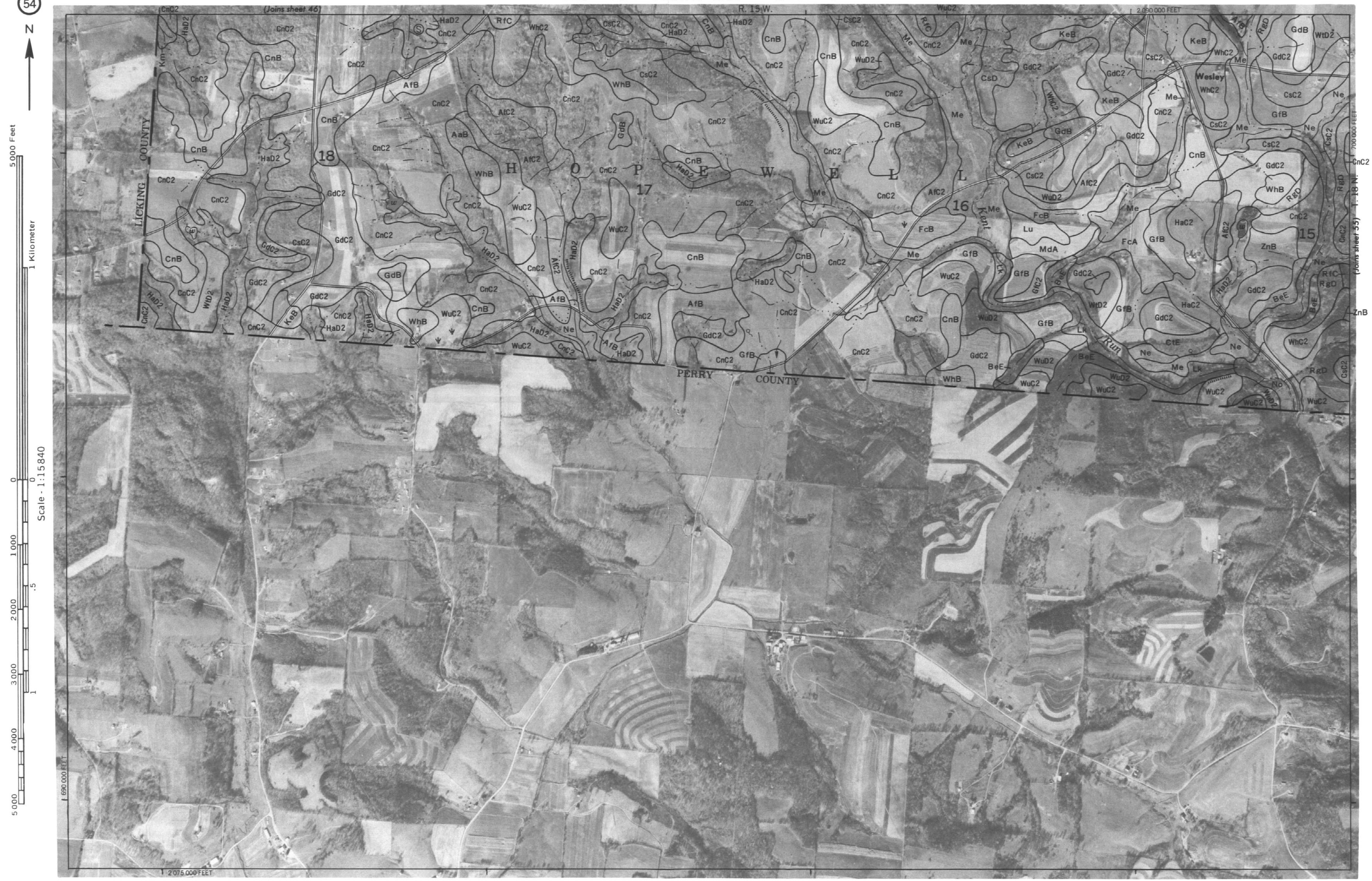
MUSKINGUM COUNTY, OHIO NO. 52

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MUSKINGUM COUNTY, OHIO NO. 53

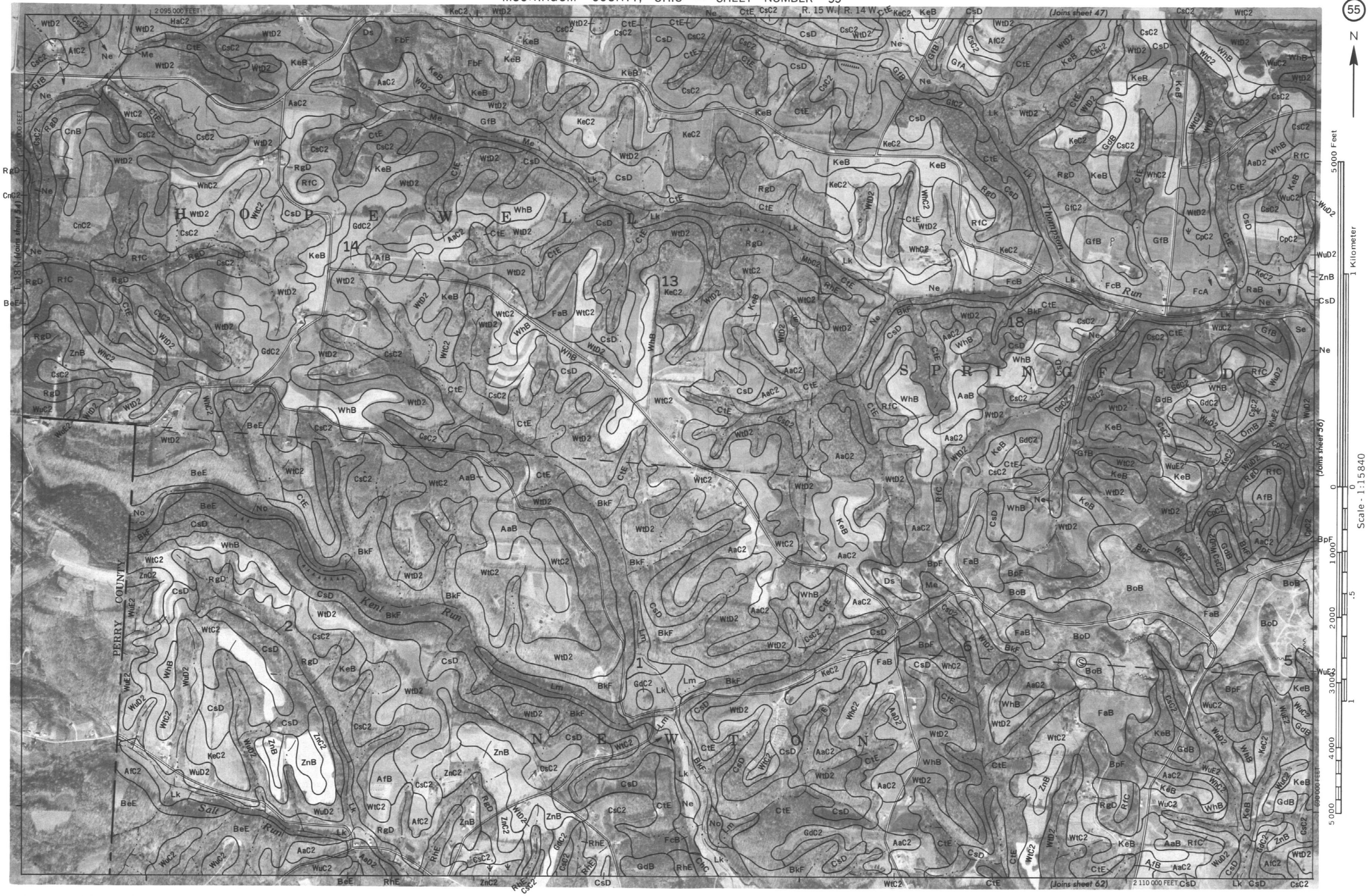

R. 5 W.
(Joins sheet 45)
2 215 000 FEET
710 000 FEET
(Joins sheet 52)
T. 13 N.
T. 1 N.
Crooked Creek
U N I O N
R I C H H I L L
GUERNSEY COUNTY
313
Rix Mills
4
(Joins sheet 61)
2 230 000 FEET
705 000 FEET
N
5 000 Feet
1 Kilometer
Scale - 1:15 840
0
1 000
2 000
3 000
4 000
5 000
.5
1
Ne
OmC
OmB
AcB
GtC2
WmB
BeE
GdC2
LpD2
Lk
BkF
WmC2
FaD
FaB
KeC2
WuD2
GtD2
LpC2
KeB
Me
WtD2
WuE2
GfB
AaB
BsC2
MsC
LrF
AfC2
WuC2
LrE2
AaC2
CrC
w


54
N
5 000 Feet
1 Kilometer
Scale 1:15 840
0
1000
2000
3000
4000
5 000
0
.5
1
(Joins sheet 46)
R. 15 W.
2 090 000 FEET
700 000 FEET
T. 18 N.
(Joins sheet 55)
690 000 FEET
2 075 000 FEET
LICKING COUNTY
PERRY COUNTY
H O P E W E L L
18
17
16
15
Wesley
Kent Run
CnC2
HaD2
CnB
CnC2
AfB
AfC2
GdC2
WuC2
WhB
CsC2
KeB
GdB
Me
FcB
Lu
MdA
FcA
GfB
HaC2
ZnB
Ne
RfC
RgD
BeE
CtE
WuD2
WtD2
Lk
No
ZnB
CnC2

MUSKINGUM COUNTY, OHIO NO. 54

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

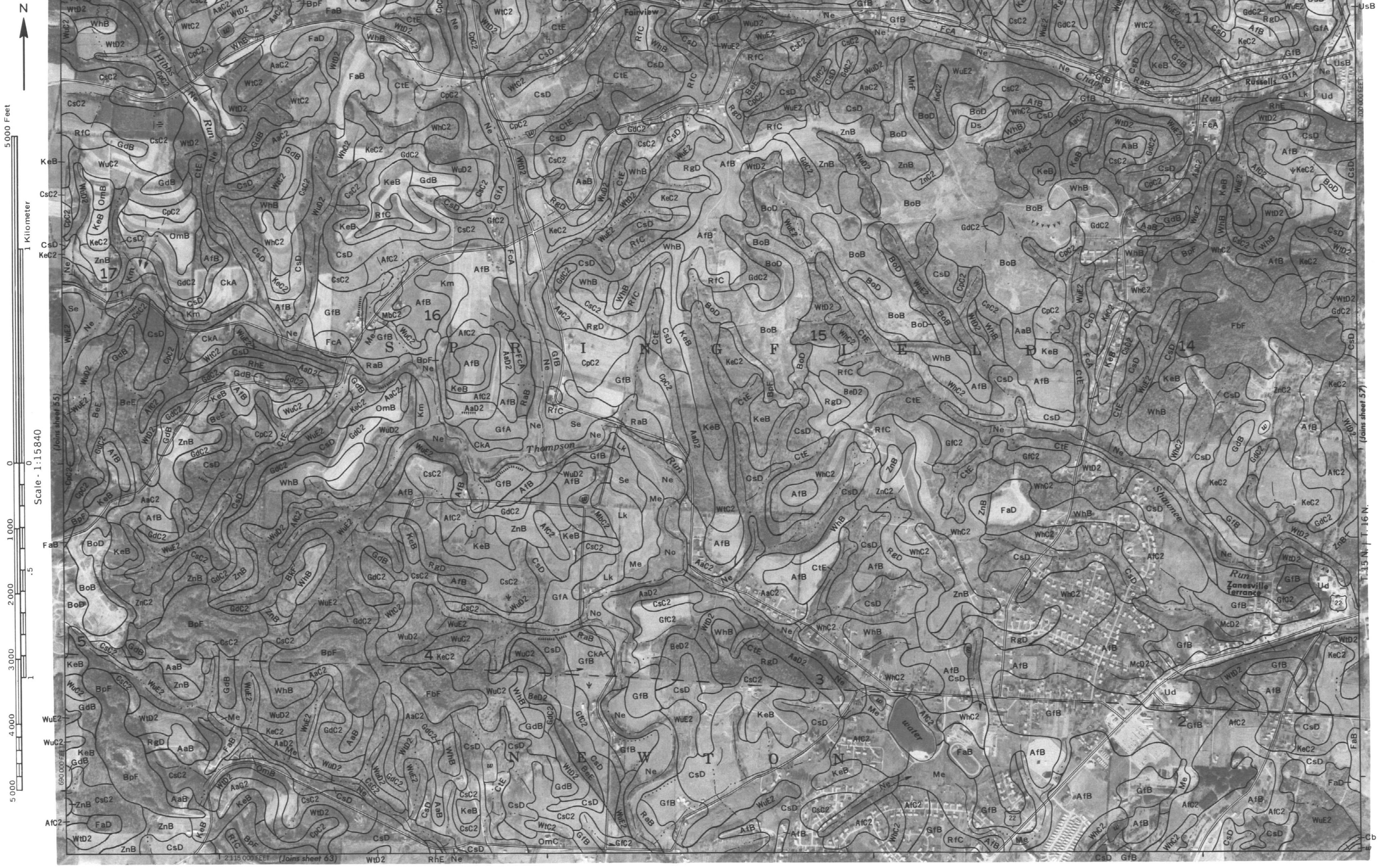
MUSKINGUM COUNTY, OHIO — SHEET NUMBER 55


55
N
(Joins sheet 47)
(Joins sheet 54)
(Joins sheet 56)
(Joins sheet 62)
R. 15 W. | R. 14 W.
T. 18 N.
2 095 000 FEET
2 110 000 FEET
HOPEWELL
SPRINGFIELD
NEWTON
PERRY COUNTY
Kent Run
Salt Run
Thompson Run
14
13
18
2
1
6
5
5 000 Feet
1 Kilometer
Scale 1:15 840
0
1000
2000
3000
4000
5000
0
.5
1

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MUSKINGUM COUNTY, OHIO NO. 55

MUSKINGUM COUNTY, OHIO — SHEET NUMBER 56


N
5000 Feet
1 Kilometer
Scale - 1:15840
(Joins sheet 48)
(Joins sheet 55)
(Joins sheet 57)
(Joins sheet 63)
R. 14 W.
T. 15 N. | T. 16 N.
2 130 000 FEET
700 000 FEET
690 000 FEET
2 115 000 FEET
Fairview
Russells
Zanesville Terrace
Hibbs Run
Chapel Run
Thompson Run
Shawnee Run
water
S P R I N G F I E L D
N E W T O N
17
16
15
14
11
5
4
3
2
22

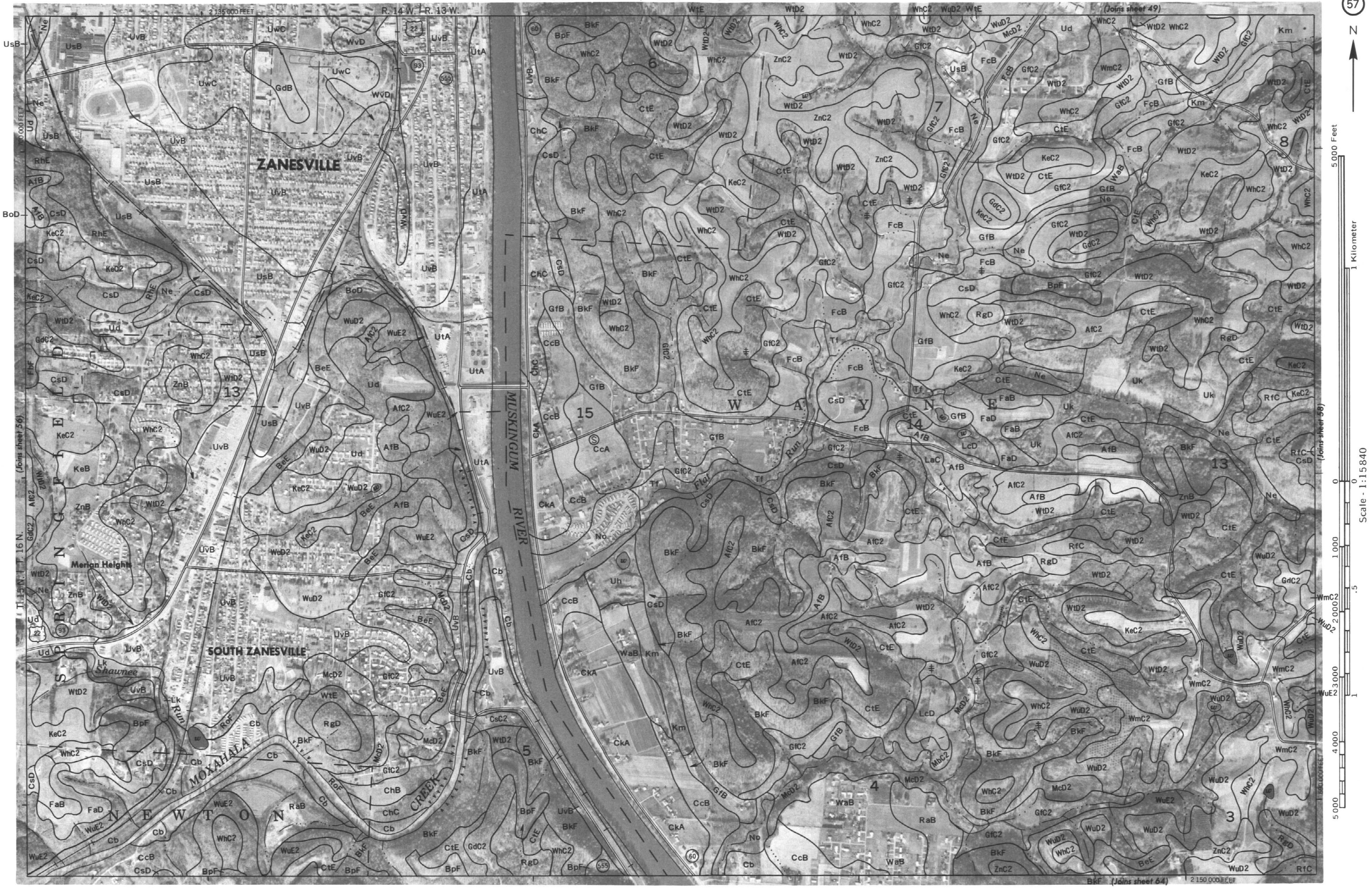
MUSKINGUM COUNTY, OHIO NO. 56

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MUSKINGUM COUNTY, OHIO — SHEET NUMBER 57

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

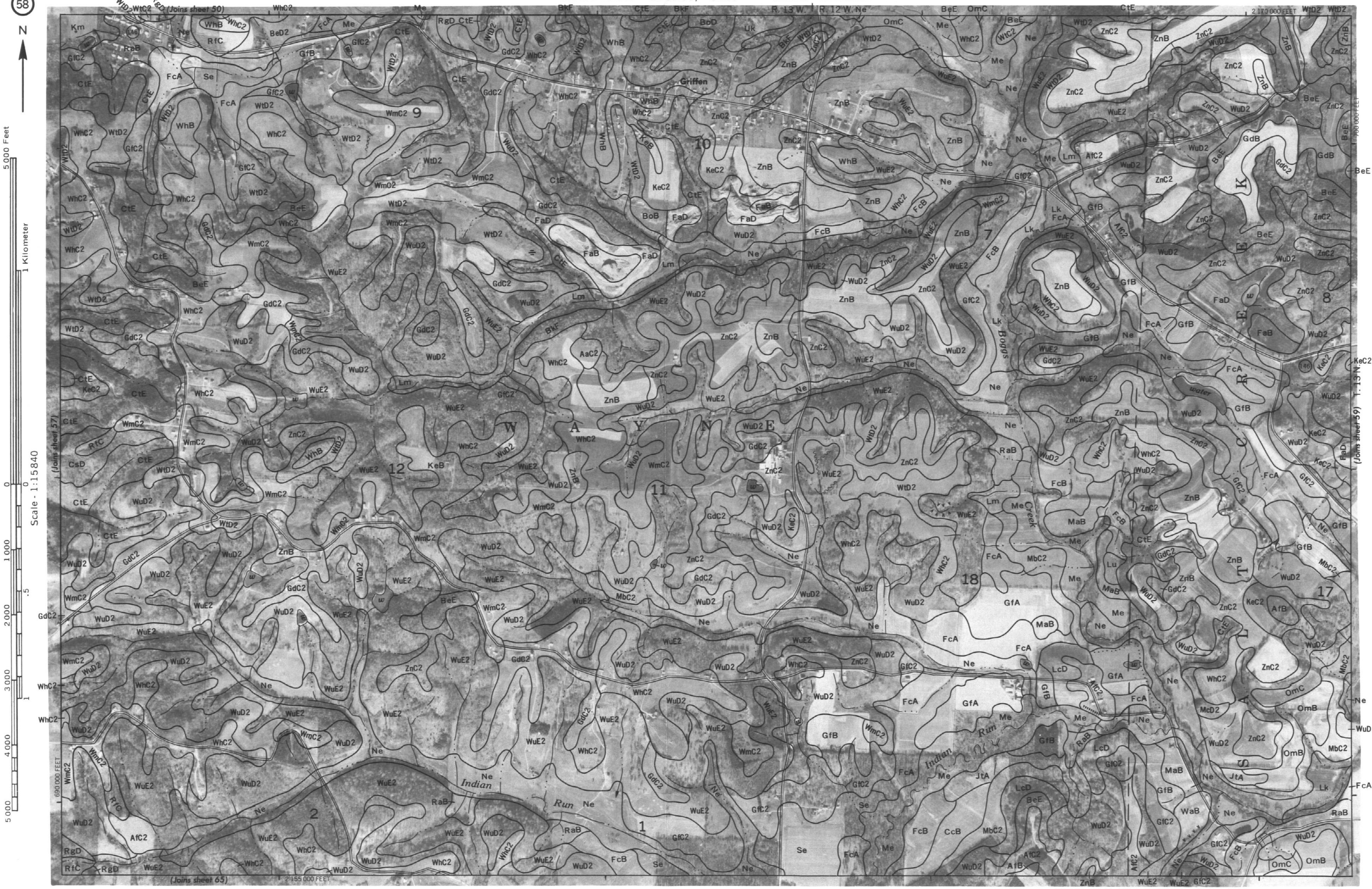
MUSKINGUM COUNTY, OHIO NO. 57



57
N
ZANESVILLE
SOUTH ZANESVILLE
Marion Heights
MUSKINGUM RIVER
MOXAHALA CREEK
Shawnee Run
Flat Run
W A Y N E
N E W T O N
S P R I N G F I E L D
R. 14 W. | R. 13 W.
T. 15 N. | T. 16 N.
2 135 000 FEET
2 150 000 FEET
700 000 FEET
680 000 FEET
(Joins sheet 49)
(Joins sheet 56)
(Joins sheet 58)
(Joins sheet 64)
5 000 Feet
1 Kilometer
Scale - 1:15840
0
1 000
2 000
3 000
4 000
5 000
.5
1

58

MUSKINGUM COUNTY, OHIO — SHEET NUMBER 58



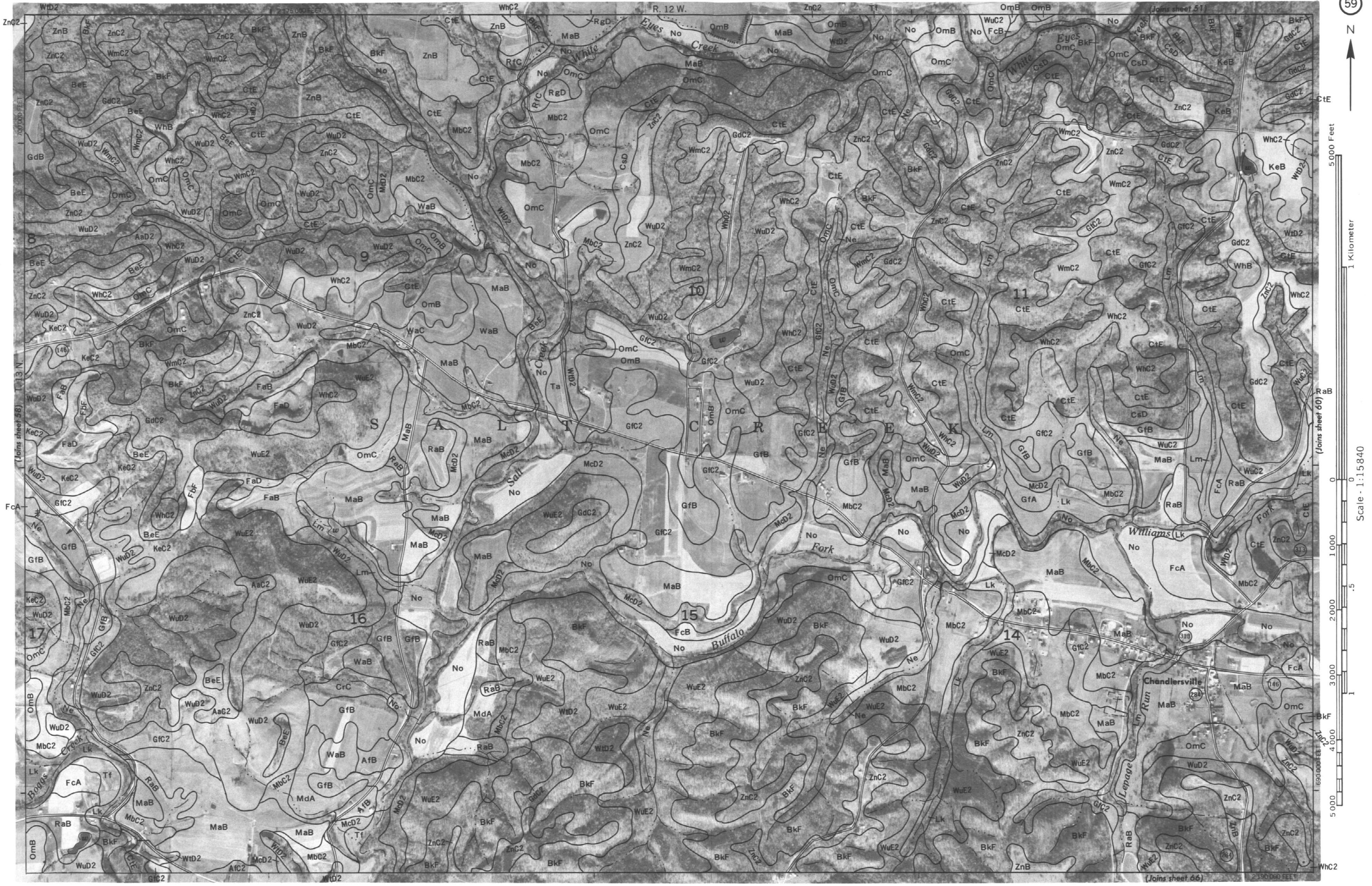
N
5000 Feet
1 Kilometer
Scale 1:15840
0
1000
2000
3000
4000
5000
0
.5
1
(Joins sheet 50)
(Joins sheet 57)
(Joins sheet 59)
(Joins sheet 65)
R. 13 W.
R. 12 W.
T. 13 N.
2 170 000 FEET
2 155 000 FEET
700 000 FEET
690 000 FEET
Griffen
W A Y N E
S A L T C R E E K
Boggs
Creek
Indian
Run
water
1
2
7
8
9
10
11
12
17
18

MUSKINGUM COUNTY, OHIO NO. 58

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MUSKINGUM COUNTY, OHIO — SHEET NUMBER 59

(59)

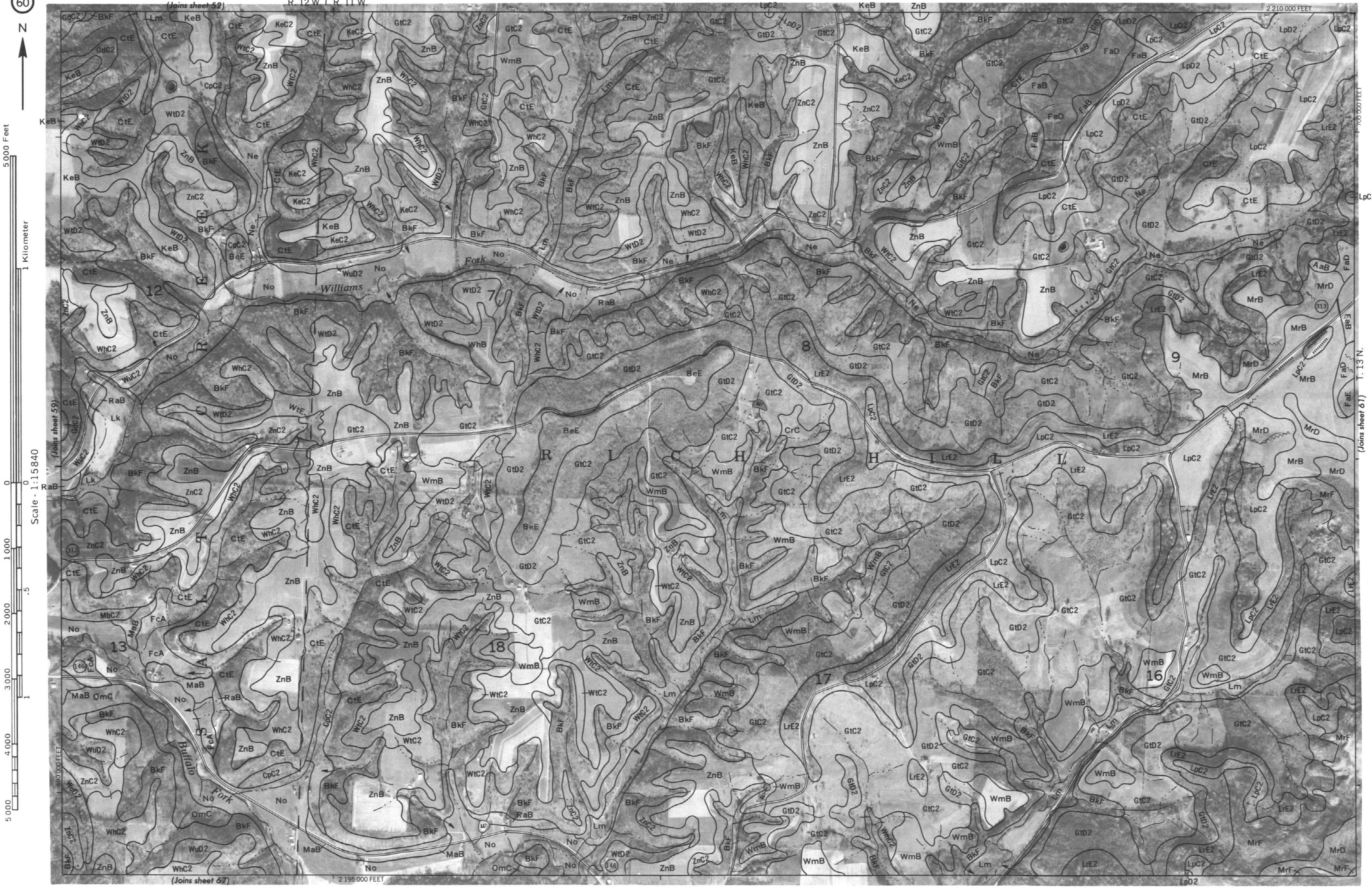


R. 12 W.
(Joins sheet 51)
(Joins sheet 58)
(Joins sheet 60)
(Joins sheet 66)
T. 13 N.
2 370 000 FEET
2 390 000 FEET
690 000 FEET
White Eyes Creek
Salt Creek
SALT CREEK
Buffalo Fork
Williams Fork
Boggs Creek
Lepage Run
Chandlersville
146
313
284
8
9
10
11
14
15
16
17
N
5000 Feet
1 Kilometer
Scale - 1:15840
0
1000
2000
3000
4000
5000
.5
1

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MUSKINGUM COUNTY, OHIO NO. 59

MUSKINGUM COUNTY, OHIO — SHEET NUMBER 60


(Joins sheet 52)
R. 12 W. | R. 11 W.
2 210 000 FEET
700 000 FEET
N
5 000 Feet
1 Kilometer
Scale - 1:15840
(Joins sheet 59)
(Joins sheet 61)
T. 13 N.
(Joins sheet 67)
2 195 000 FEET
690 000 FEET
Williams Fork
Buffalo Fork
RICHHILL
313
146
12
13
7
8
9
16
17
18

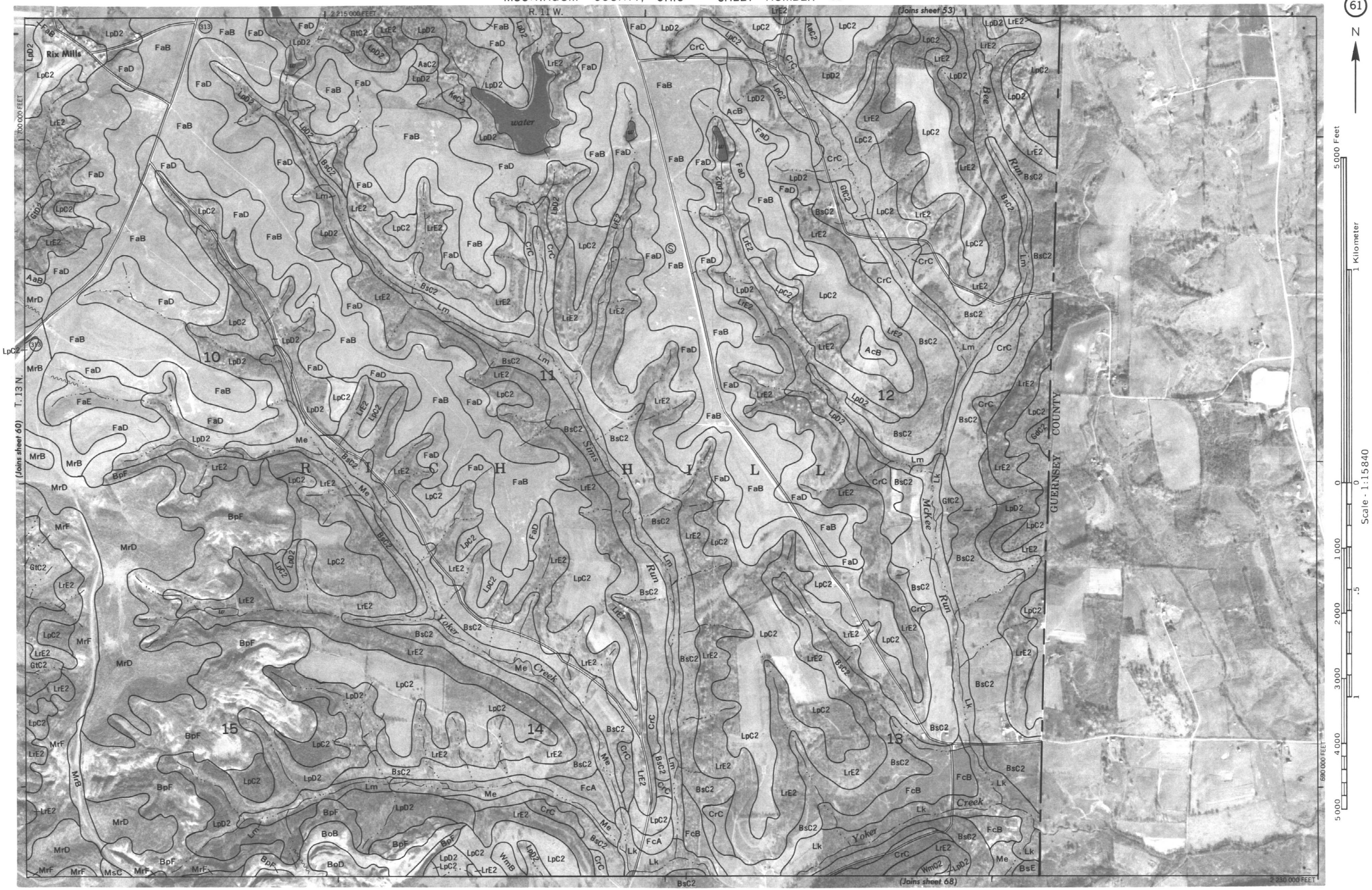
MUSKINGUM COUNTY, OHIO NO. 60

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

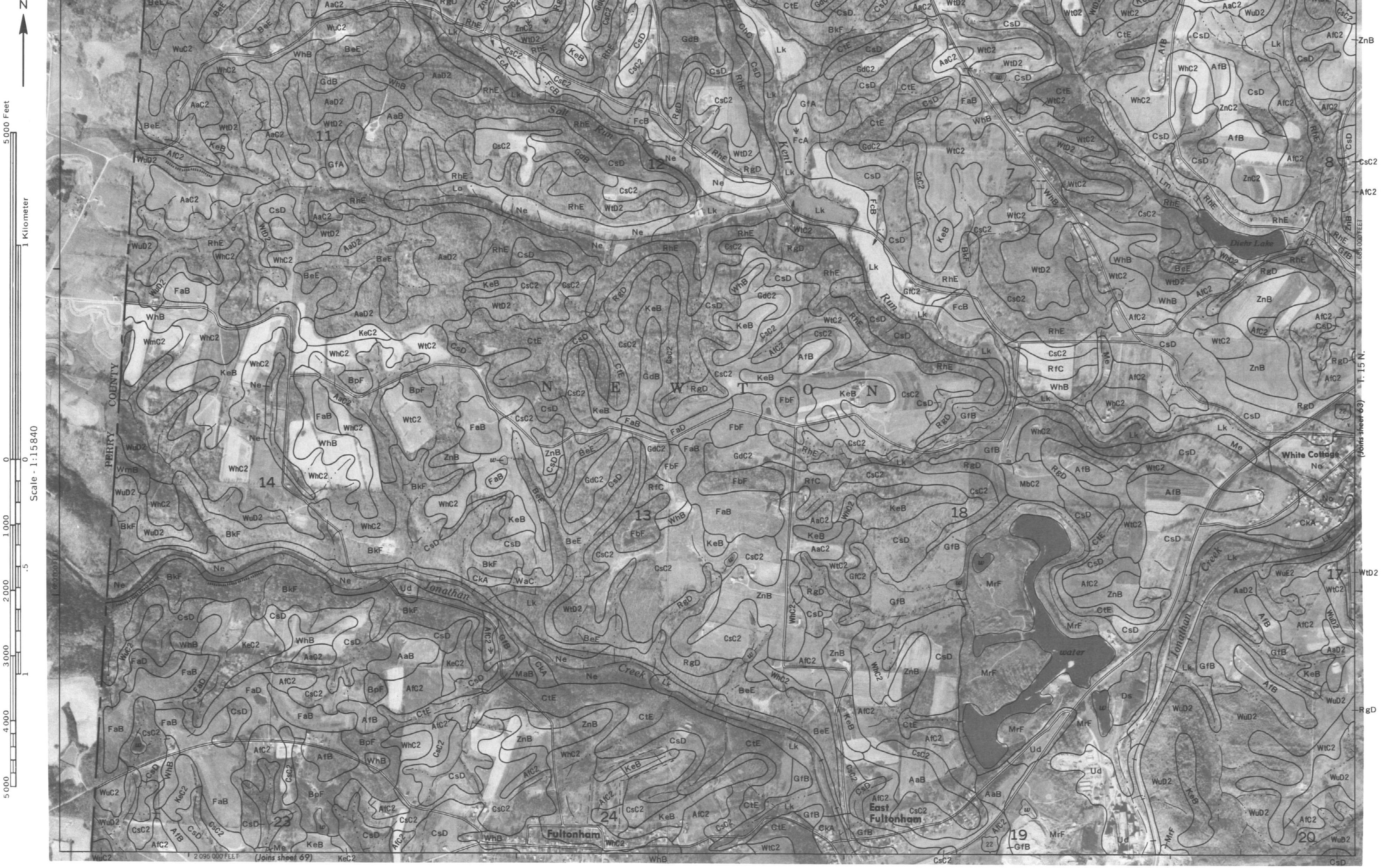
MUSKINGUM COUNTY, OHIO — SHEET NUMBER 61

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MUSKINGUM COUNTY, OHIO NO. 61


R. 11 W.
T. 13 N.
2 215 000 FEET
700 000 FEET
690 000 FEET
2 230 000 FEET
(Joins sheet 53)
(Joins sheet 60)
(Joins sheet 68)
Rix Mills
313
water
R I C H H I L L
Sims Run
Bee Run
McKee Run
Yoker Creek
GUERNSEY COUNTY
10
11
12
13
14
15
FaB
FaD
FaE
FcA
FcB
LpC2
LpD2
LrE2
BsC2
CrC
AcB
AaB
AaC2
GfC2
GtC2
KeC2
Lm
Lk
Me
MrB
MrD
MrF
MsC
BpF
BoB
BoD
BsE
WmB
WmC2
w
N
5 000 Feet
1 Kilometer
0
.5
1
1 000
2 000
3 000
4 000
5 000
Scale - 1:15840

MUSKINGUM COUNTY, OHIO — SHEET NUMBER 62

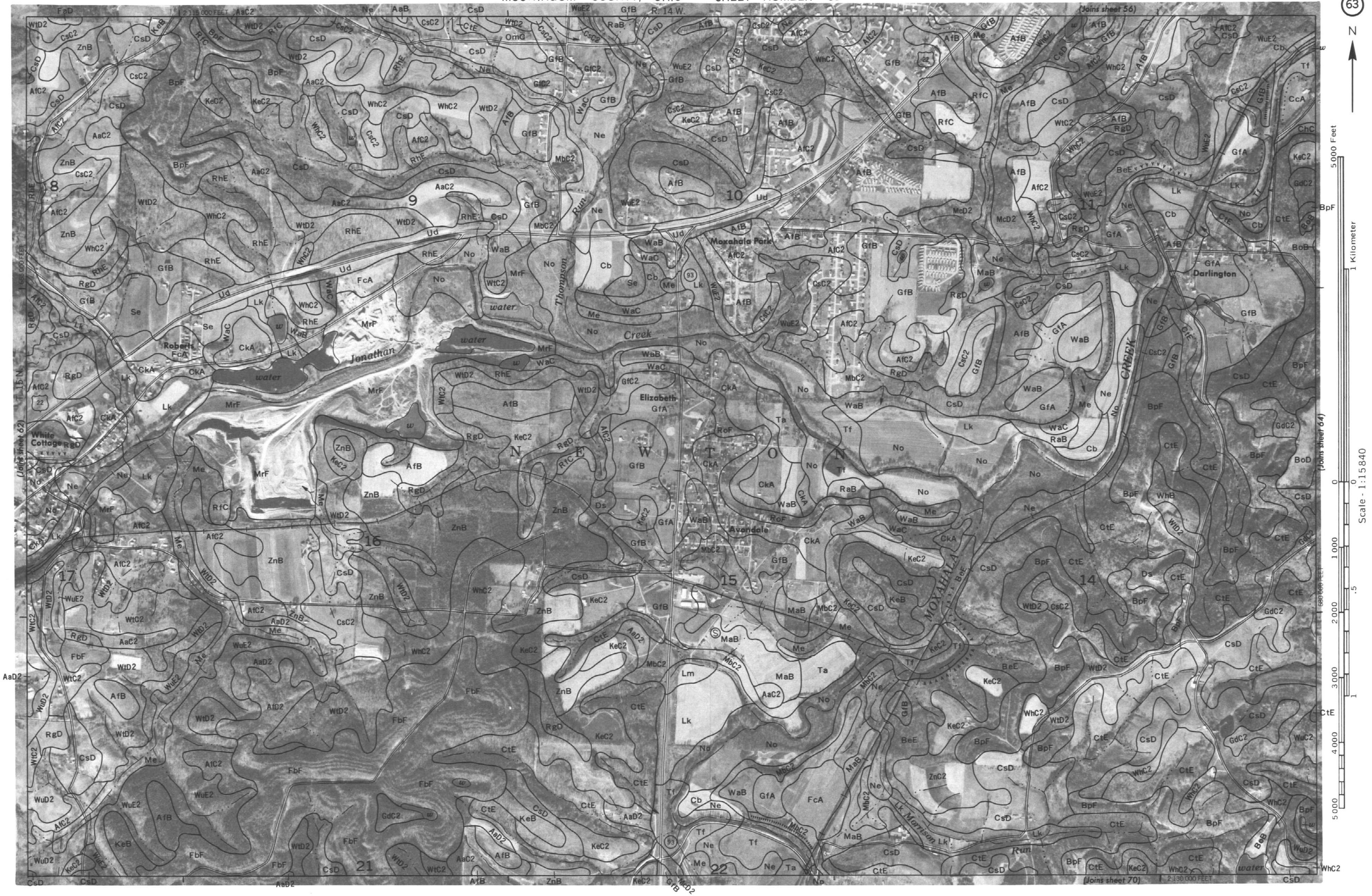

N
Scale - 1:15840
5 000 Feet
1 Kilometer
0
.5
1
1000
2000
3000
4000
5000
(Joins sheet 55)
(Joins sheet 63)
(Joins sheet 69)
R. 15 W. | R. 14 W.
T. 15 N.
2 110 000 FEET
2 095 000 FEET
665 000 FEET
680 000 FEET
PERRY COUNTY
N E W T O N
Salt Run
Kent Run
Jonathan Creek
Dillon Lake
water
White Cottage
Fultonham
East Fultonham
22
11
12
7
8
14
13
18
17
23
24
19
20

MUSKINGUM COUNTY, OHIO NO. 62

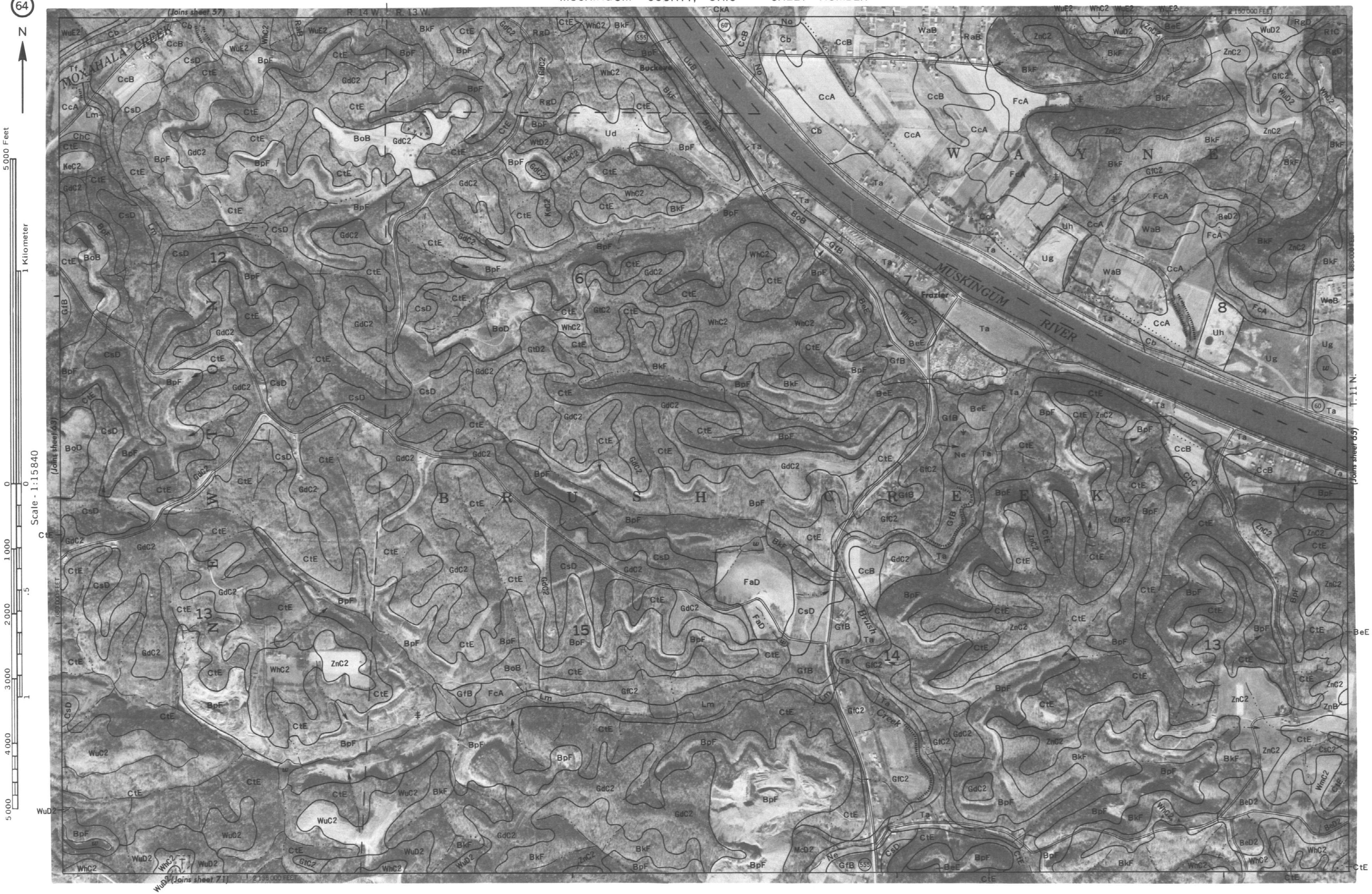
This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, shown, are approximately positioned.

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MUSKINGUM COUNTY, OHIO NO. 63


(Joins sheet 56)
(Joins sheet 62)
(Joins sheet 64)
(Joins sheet 70)
2 115 000 FEET
2 130 000 FEET
R. 14 W.
T. 15 N.
N
Moxahala Park
Darlington
Elizabeth
Avondale
Roberts
White Cottage
N E W T O N
Jonathan
Creek
Thompson
Run
MOXAHALA
CREEK
Morrison
Run
water
8
9
10
11
14
15
16
17
21
22
93
22
Scale - 1:15840
5000 Feet
1 Kilometer
0
.5
1
1000
2000
3000
4000
5000

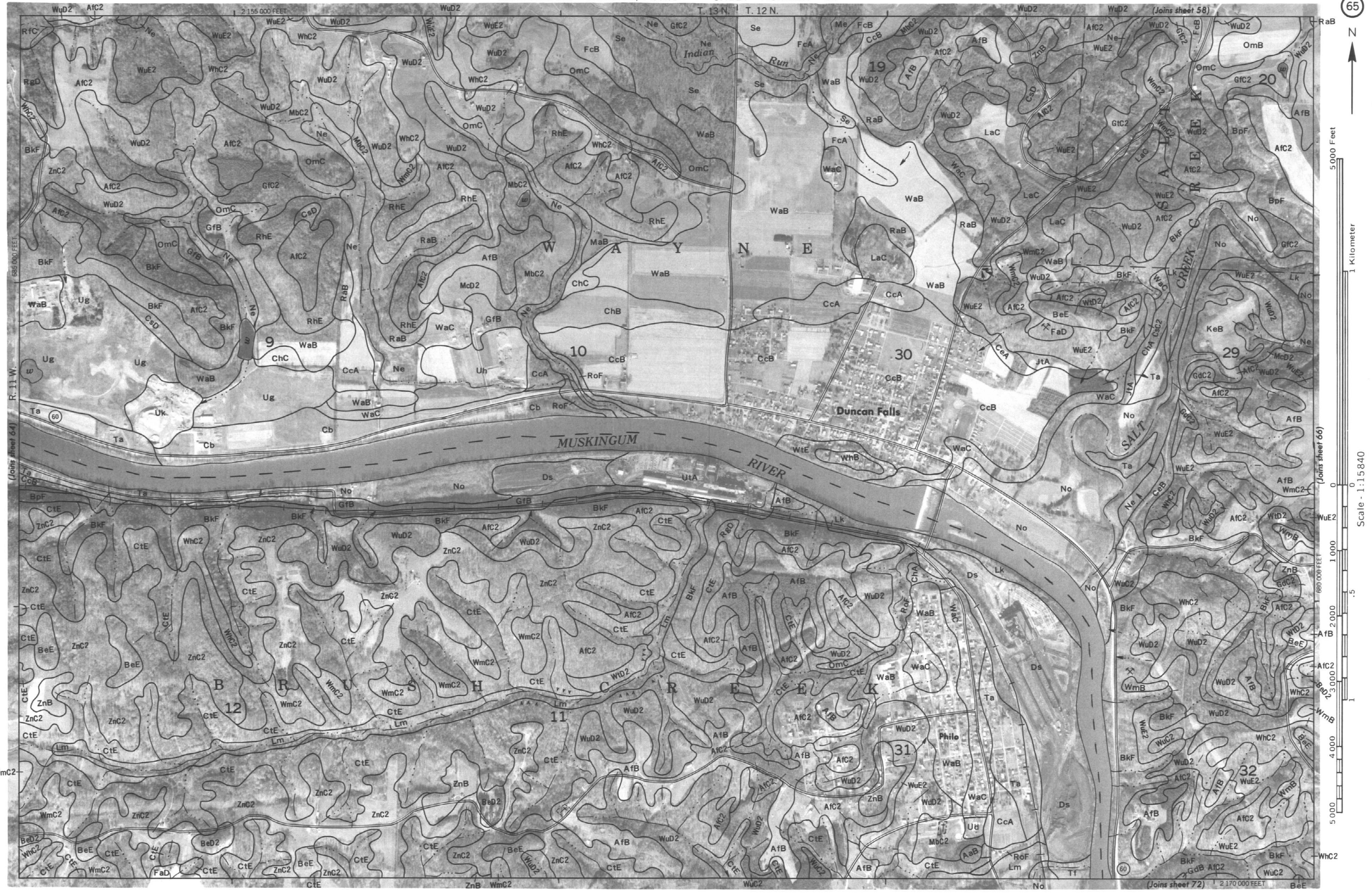
MUSKINGUM COUNTY, OHIO — SHEET NUMBER 64


N
5 000 Feet
1 Kilometer
Scale - 1:15840
0
.5
1
1000
2000
3000
4000
5 000
(Joins sheet 57)
(Joins sheet 63)
(Joins sheet 65)
(Joins sheet 71)
R. 14 W.
R. 13 W.
T. 11 N.
2 150 000 FEET
2 135 000 FEET
690 000 FEET
685 000 FEET
MOXAHALA CREEK
MUSKINGUM RIVER
Brush Creek
Buckeye
Frazier
WAYNE
NEWTON
BRUSH CREEK
60
555
12
6
7
8
13
15
14
WuE2
Cb
CcB
CsD
CtE
BpF
GdC2
RaB
WhC2
BkF
RgD
CkA
No
WaB
RaB
ZnC2
WuD2
BeE
RfC
GfC2
Tf
CcA
Lm
ChC
KeC2
BoB
BoD
Ud
WtD2
FcA
Ta
LuB
BoB
GfB
Uh
Ug
BeD2
WhC2
GtD2
FaD
Ne
ZnB
CsC2
WmC2
WuC2
McD2
GfC2

MUSKINGUM COUNTY, OHIO NO. 64

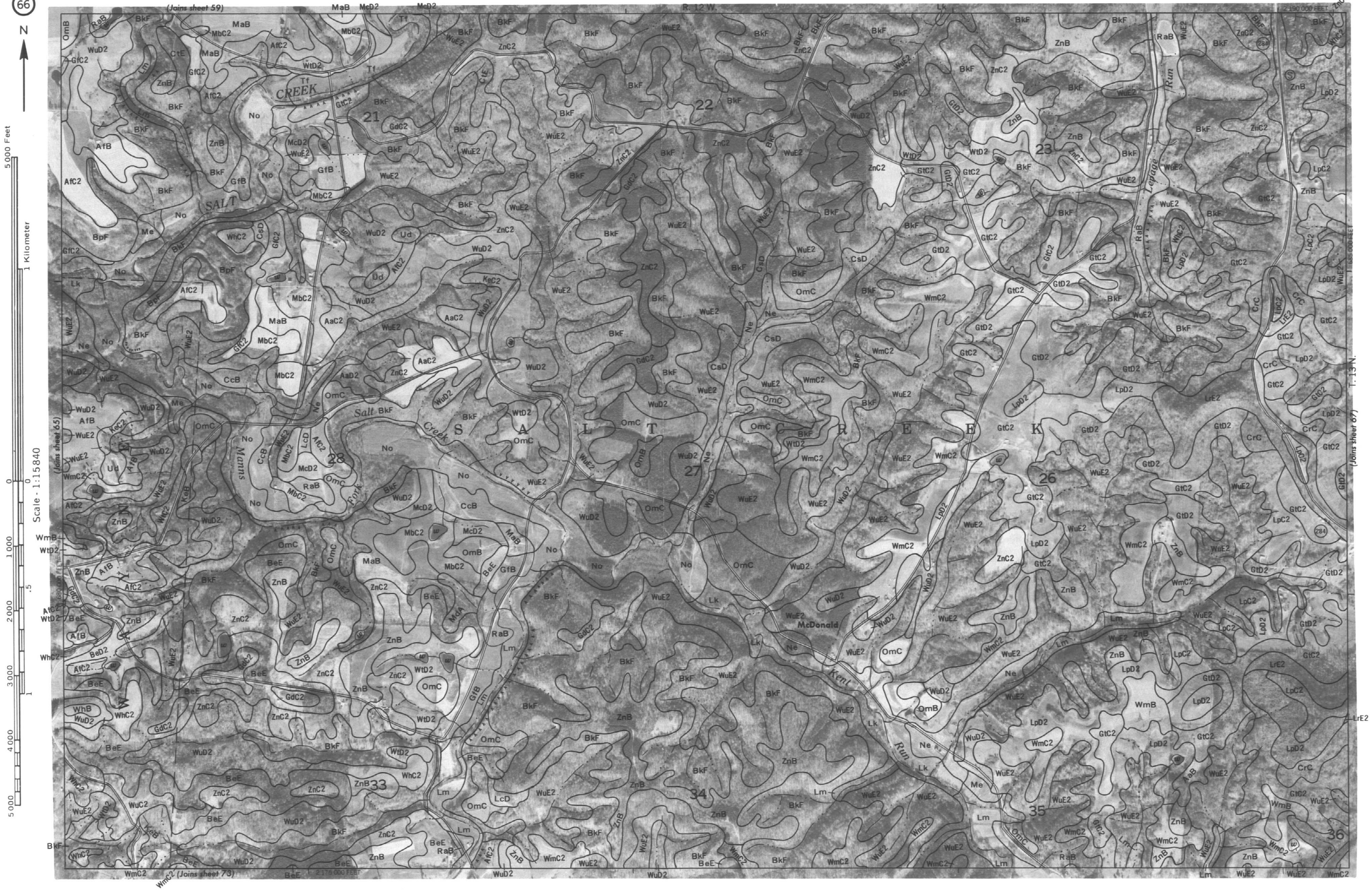
This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MUSKINGUM COUNTY, OHIO — SHEET NUMBER 65


65
(Joins sheet 58)
(Joins sheet 64)
(Joins sheet 66)
(Joins sheet 72)
2 155 000 FEET
2 170 000 FEET
685 000 FEET
680 000 FEET
T. 13 N.
T. 12 N.
R. 11 W.
Indian Run
W A Y N E
MUSKINGUM RIVER
Duncan Falls
Philo
SALT CREEK
B R U S H C R E E K
9
10
11
12
19
20
29
30
31
32
60
N
5000 Feet
1 Kilometer
0
1000
2000
3000
4000
5000
.5
1
Scale - 1:15840

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

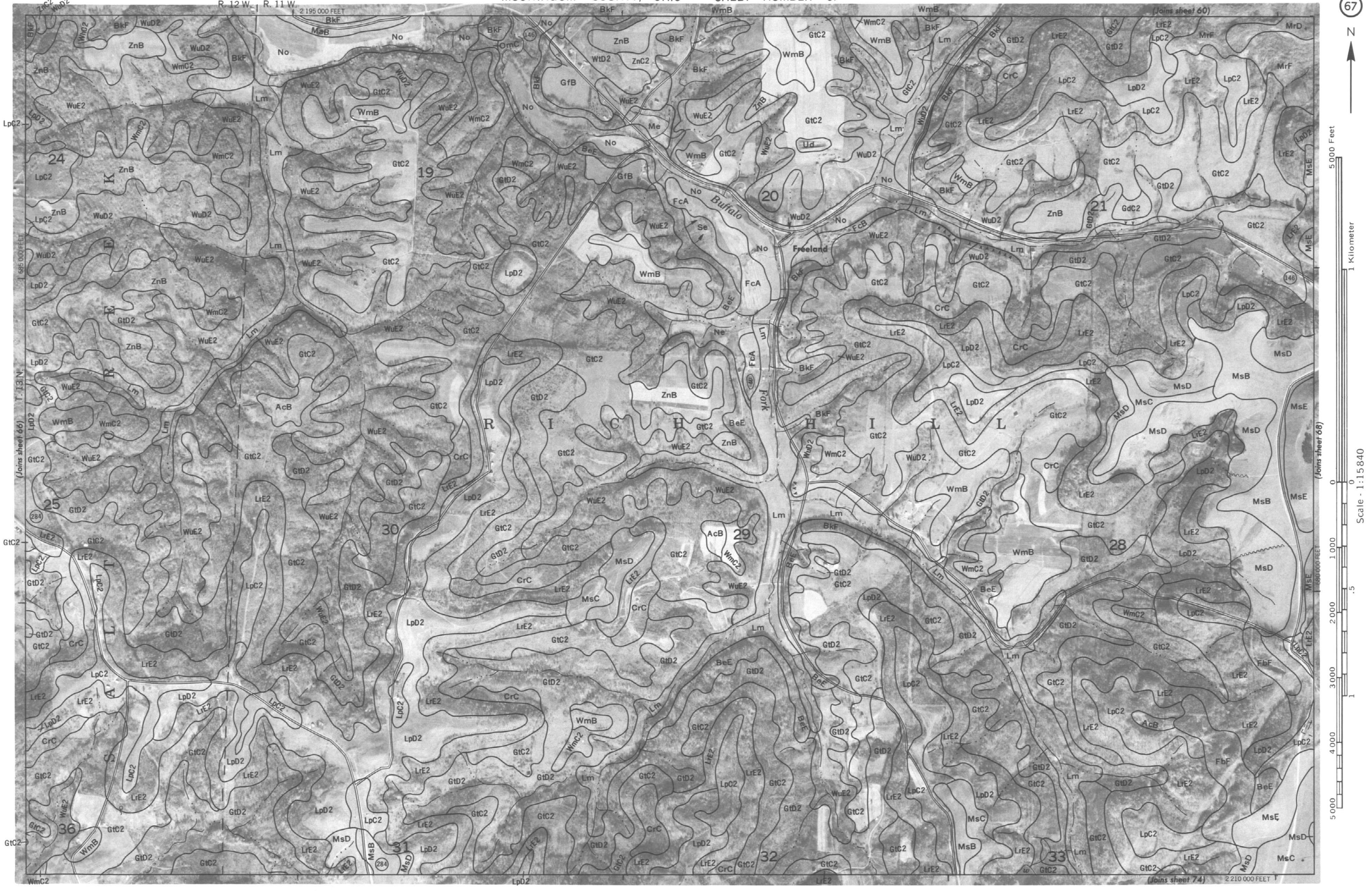
MUSKINGUM COUNTY, OHIO NO. 65


66
N
5 000 Feet
1 Kilometer
Scale - 1:15840
0
1000
2000
3000
4000
5000
0
.5
1
(Joins sheet 59)
(Joins sheet 65)
(Joins sheet 67)
(Joins sheet 73)
R. 12 W.
T. 13 N.
2 190 000 FEET
2 175 000 FEET
SALT CREEK
Salt Creek
Manns Fork
Lepage Run
Kent Run
McDonald
284
21
22
23
26
27
28
33
34
35
36

MUSKINGUM COUNTY, OHIO NO. 66

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

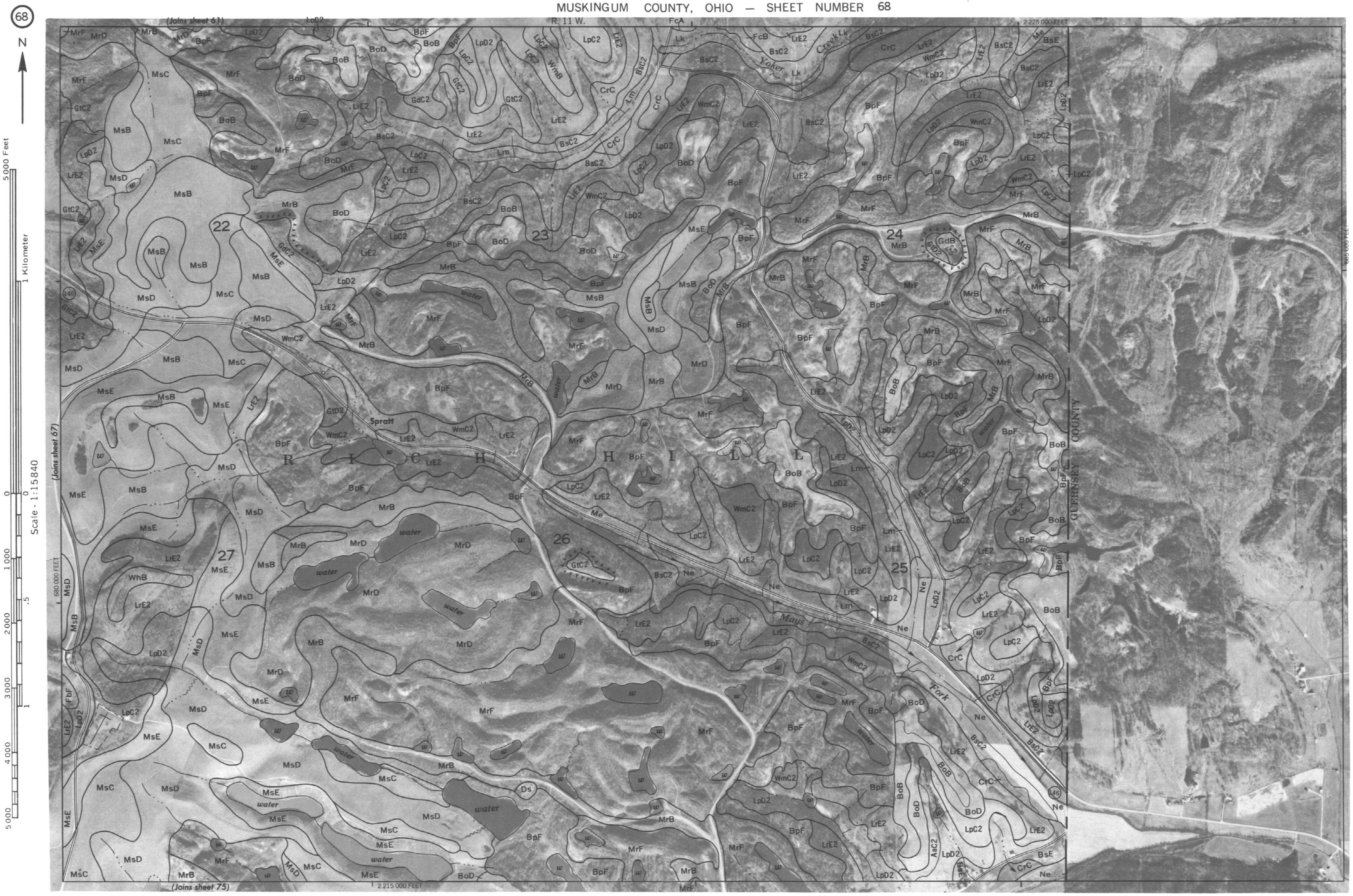
MUSKINGUM COUNTY, OHIO — SHEET NUMBER 67


R. 12 W.
R. 11 W.
2 195 000 FEET
(Joins sheet 60)
(Joins sheet 66)
(Joins sheet 68)
(Joins sheet 74)
2 210 000 FEET
585 000 FEET
580 000 FEET
T. 13 N.
N
Scale 1:15840
5000 Feet
1 Kilometer
0
1000
2000
3000
4000
5000
.5
1
FALLS
CREEK
RICH HILL
Buffalo
Fork
Freeland
146
284
19
20
21
24
25
28
29
30
31
32
33
36
No
MaB
BkF
ZnB
WuD2
WuE2
WmC2
WmB
GtC2
GtD2
LpC2
LpD2
LrE2
Lm
GfB
FcA
FcB
Se
Me
Ne
BeE
ZnC2
WtD2
OmC
Ud
CrC
AcB
MsB
MsC
MsD
MsE
MrD
MrF
FbF
GdC2

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

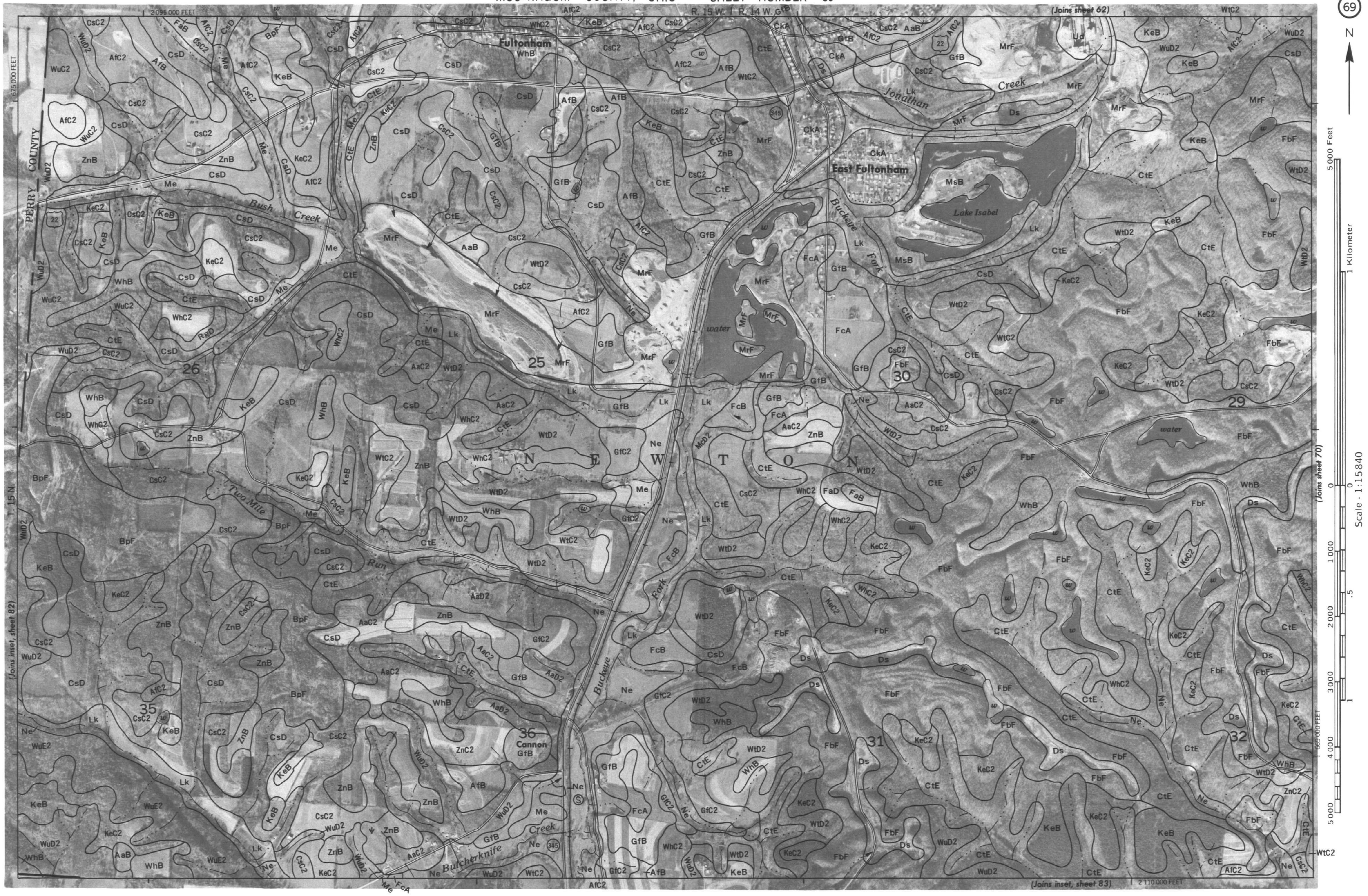
MUSKINGUM COUNTY, OHIO NO. 67

MUSKINGUM COUNTY, OHIO — SHEET NUMBER 68


N
5 000 Feet
1 Kilometer
Scale - 1:15840
0
1 000
2 000
3 000
4 000
5 000
0
.5
1
(Joins sheet 61)
(Joins sheet 67)
(Joins sheet 75)
R. 11 W.
2 225 000 FEET
2 215 000 FEET
680 000 FEET
685 000 FEET
22
23
24
25
26
27
R I C H H I L L
Spratt
Yoker Creek
Mays Fork
GUERNSEY COUNTY
146
water
w

MUSKINGUM COUNTY, OHIO NO. 68

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

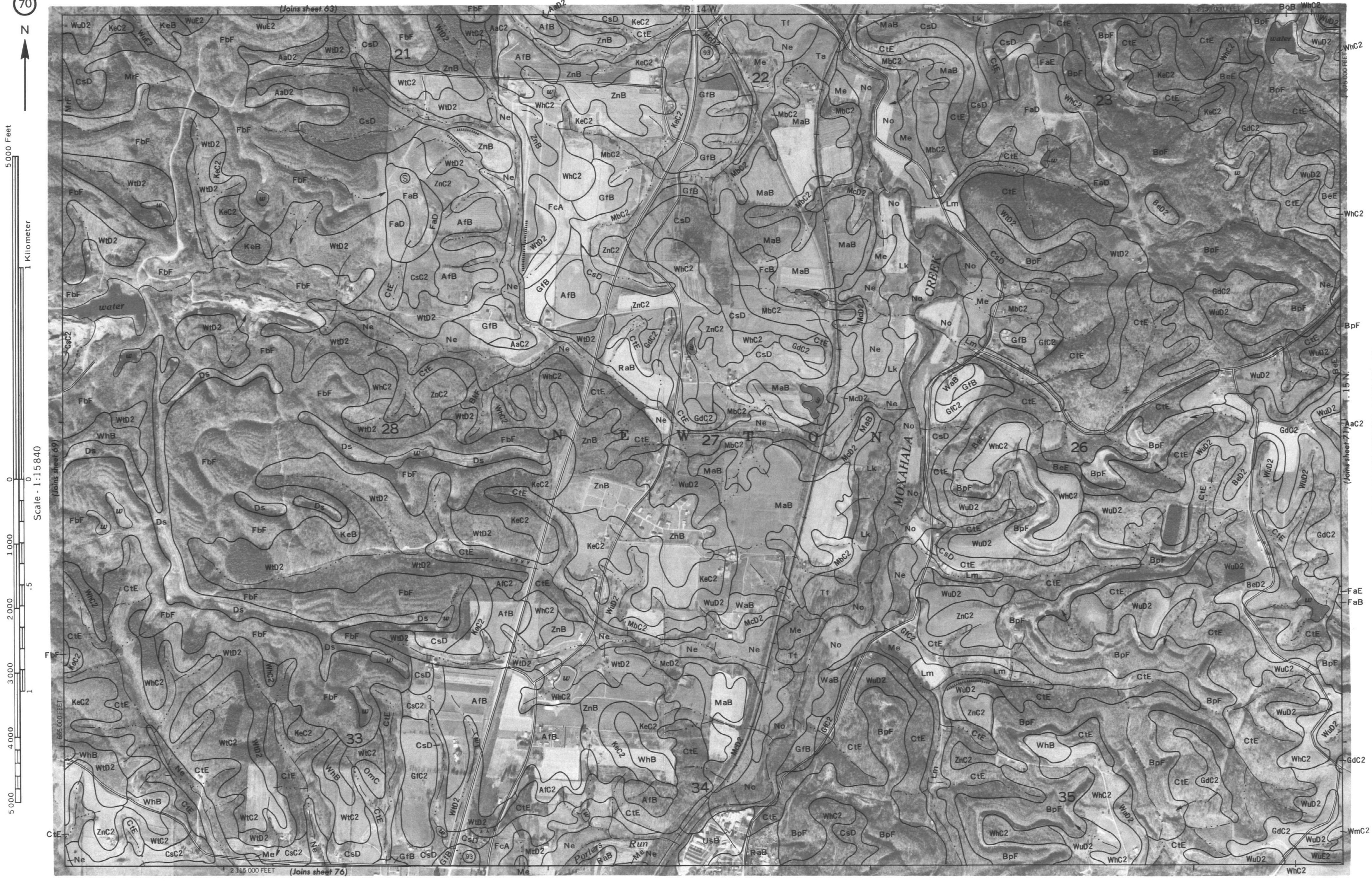

Fultonham
East Fultonham
Lake Isabel
Jonathan Creek
Bush Creek
Two Mile Run
Buckeye Fork
Butcherknife Creek
Cannon
PERRY COUNTY
NEWTON
R. 15 W. | R. 14 W.
T. 15 N.
(Joins sheet 62)
(Joins sheet 70)
(Joins inset, sheet 83)
(Joins inset, sheet 82)
2 095 000 FEET
2 110 000 FEET
675 000 FEET
665 000 FEET
25
26
29
30
31
32
35
36
22
345
N
5 000 Feet
1 Kilometer
Scale - 1:15840

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MUSKINGUM COUNTY, OHIO NO. 69

70

MUSKINGUM COUNTY, OHIO — SHEET NUMBER 70


N
5000 Feet
1 Kilometer
Scale 1:15 840
0
1000
2000
3000
4000
5000
0
.5
1
(Joins sheet 63)
(Joins sheet 69)
(Joins sheet 71)
(Joins sheet 76)
R. 14 W.
T. 15 N.
2 150 000 FEET
2 115 000 FEET
665 000 FEET
NEWTON
MOXAHALA CREEK
Porters Run
93
21
22
23
26
27
28
33
34
35
water

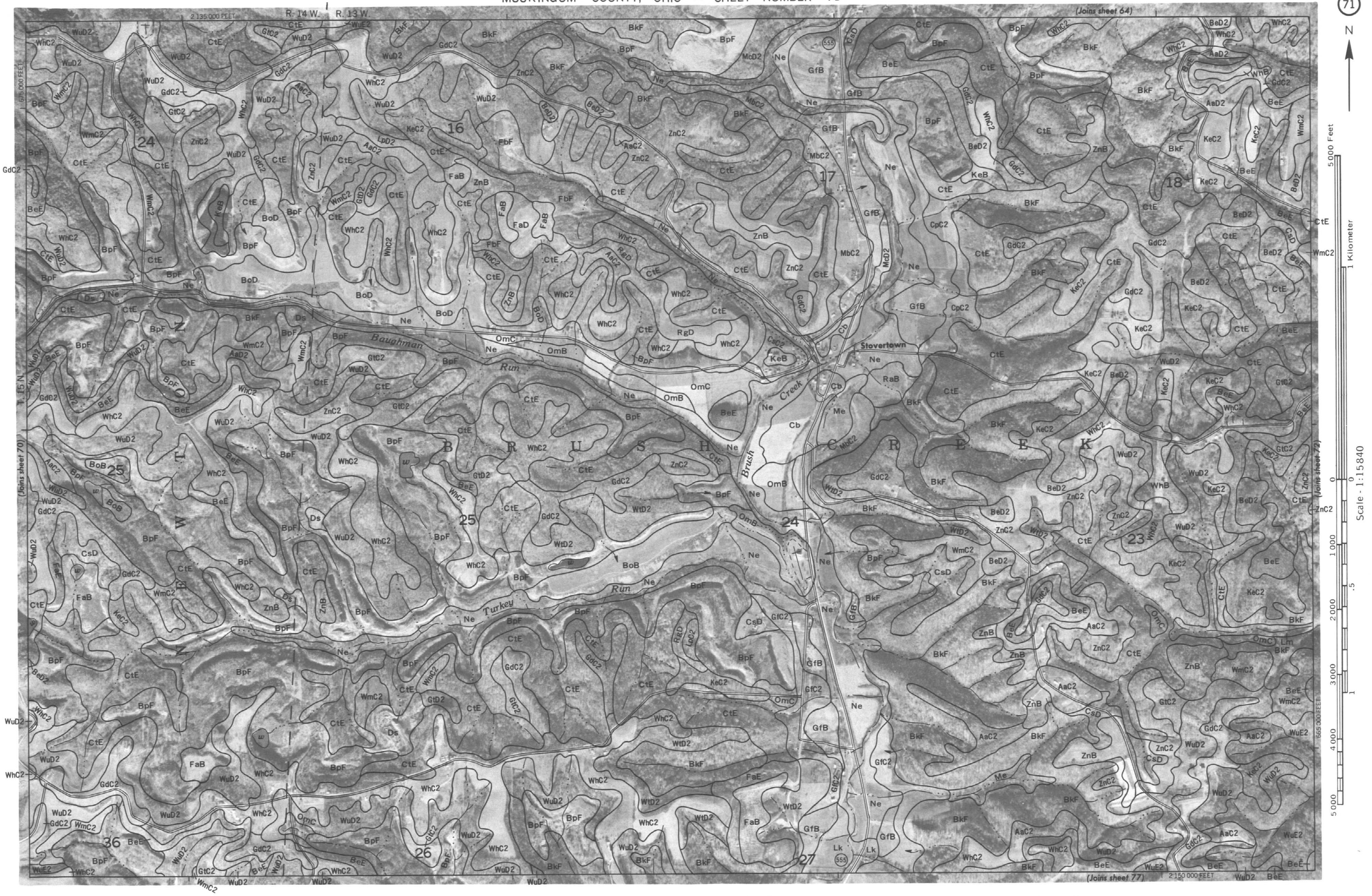
MUSKINGUM COUNTY, OHIO NO. 70

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

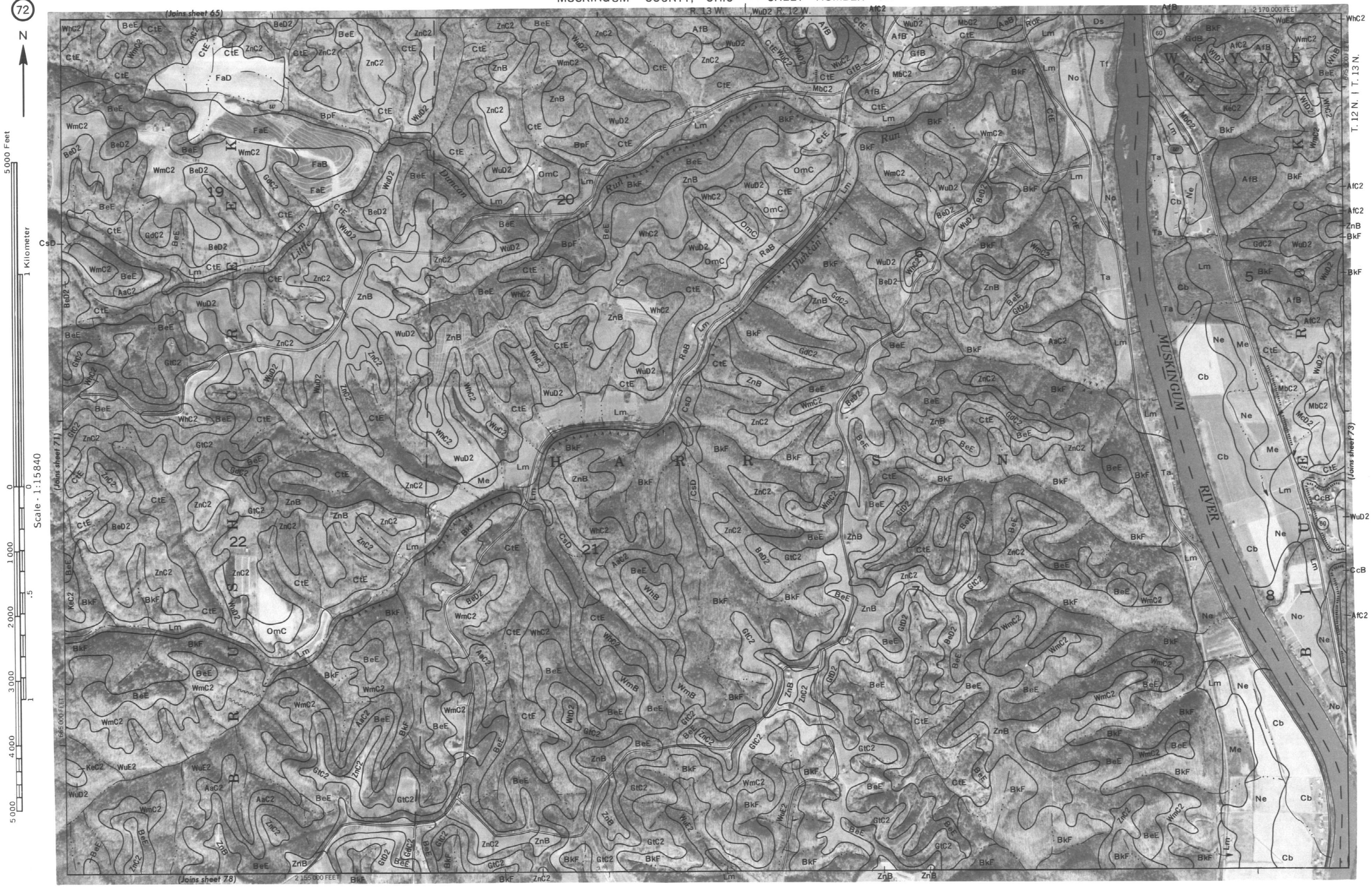
MUSKINGUM COUNTY, OHIO — SHEET NUMBER 71

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MUSKINGUM COUNTY, OHIO NO. 71


71
N
R. 14 W.
R. 13 W.
2 135 000 FEET
(Joins sheet 64)
675 000 FEET
T. 15 N.
(Joins sheet 70)
(Joins sheet 72)
(Joins sheet 77)
2 150 000 FEET
665 000 FEET
Baughman Run
Turkey Run
Brush Creek
Stovertown
BRUSH CREEK
NEWTON
555
16
17
18
23
24
25
26
27
36
5 000 Feet
1 Kilometer
Scale - 1:15840
0
1000
2000
3000
4000
5000
.5
1

MUSKINGUM COUNTY, OHIO — SHEET NUMBER 72


72
N
(Joins sheet 65)
(Joins sheet 71)
(Joins sheet 73)
(Joins sheet 78)
R. 13 W.
R. 12 W.
T. 12 N.
T. 13 N.
2 170 000 FEET
2 155 000 FEET
665 000 FEET
5000 Feet
1 Kilometer
Scale - 1:15 840
0
1000
2000
3000
4000
5000
.5
1
MUSKINGUM RIVER
H A R R I S O N
W A Y N E
B R U S H C R E E K
B L U E R O C K
Duncan Run
Little Duncan
Run
19
20
21
22
5
6
7
8
60
FaD
FaE
FaB
BpF
OmC
Lm
No
Tf
Ds
Ne
Me
Cb
Ta
CcB
BkF
BeE
CtE
ZnB
ZnC2
WuD2
WmC2
WhC2
GdC2
GtC2
GtD2
BeD2
AfB
AfC2
AaC2
AaB
KeC2
MbC2
McD2
CsD
RaB
RoF
WmB
WhB
WuC2
WuE2
CsD

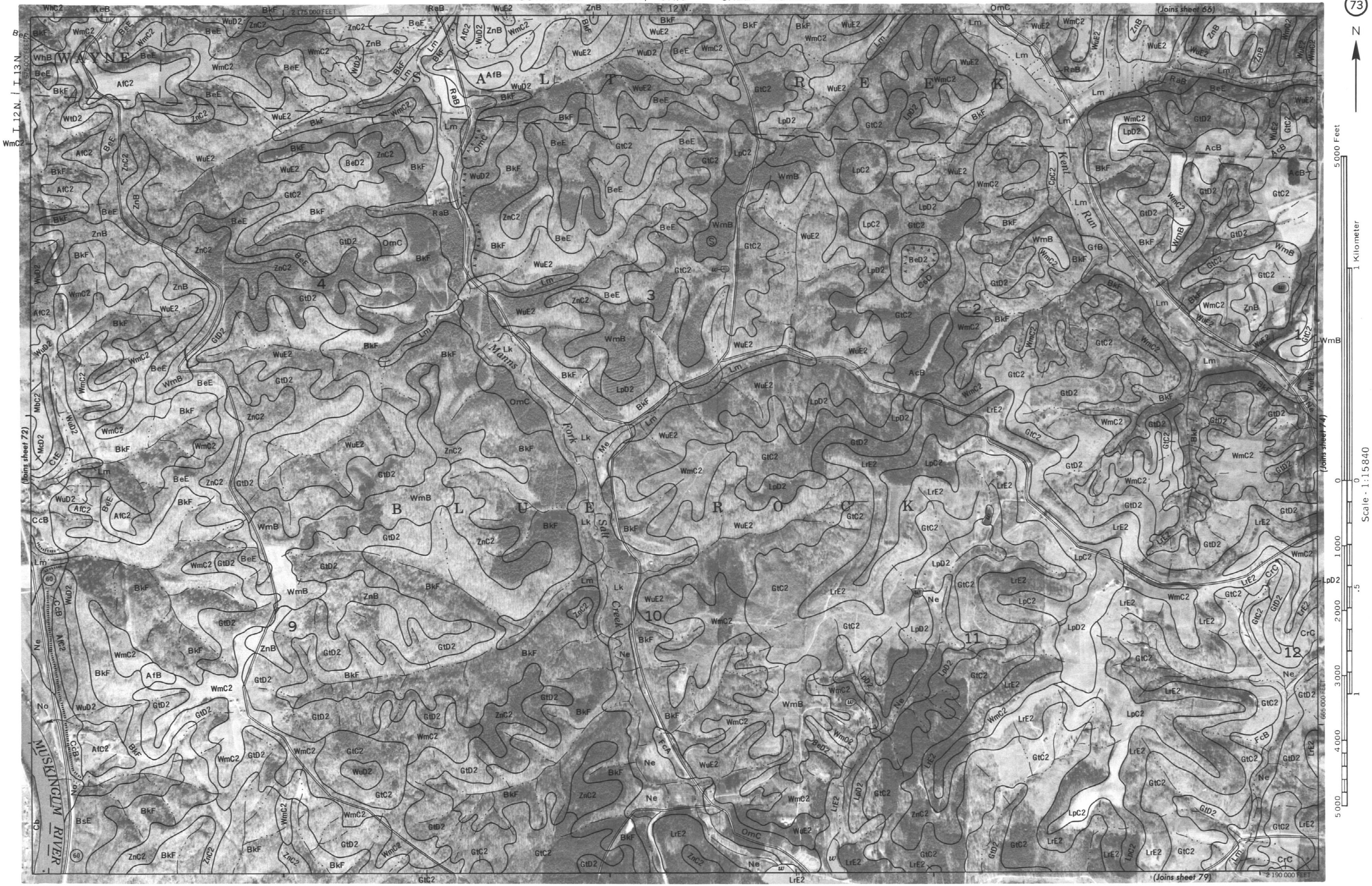
MUSKINGUM COUNTY, OHIO NO. 72

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

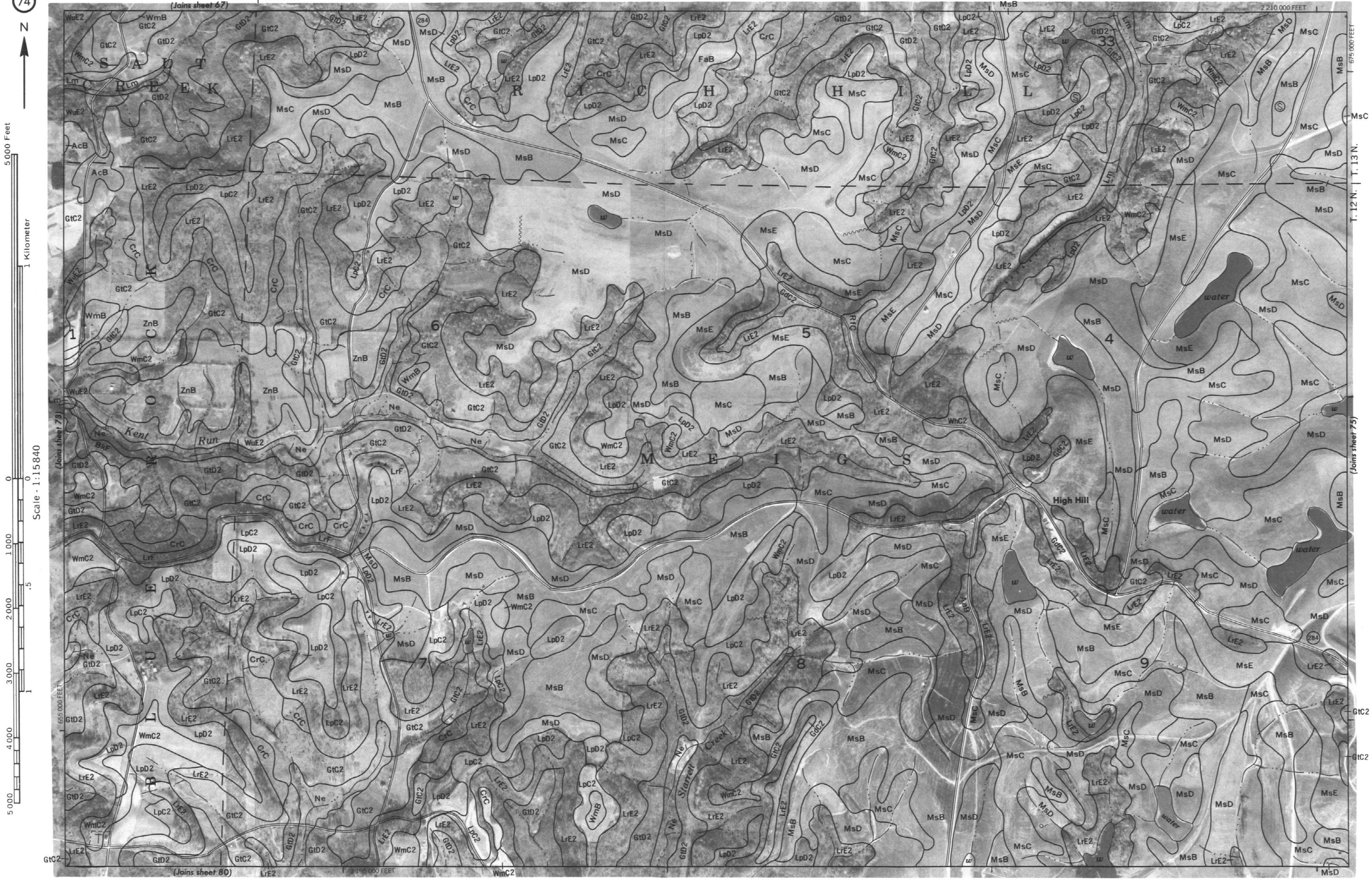
MUSKINGUM COUNTY, OHIO — SHEET NUMBER 73

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MUSKINGUM COUNTY, OHIO NO. 73


(Joins sheet 66)
(Joins sheet 72)
(Joins sheet 74)
(Joins sheet 79)
R. 12 W.
T. 13 N.
T. 12 N.
2 175 000 FEET
2 190 000 FEET
665 000 FEET
WAYNE
SALT CREEK
BLUE ROCK
Manns Fork
Salt Creek
Kent Run
MUSKINGUM RIVER
60
1
2
3
4
9
10
11
12
N
5000 Feet
1 Kilometer
Scale - 1:15840
0
1000
2000
3000
4000
5000
.5
1
BkF
WmC2
GtD2
WuE2
GtC2
ZnC2
BeE
LpD2
LrE2
WmB
ZnB
Lm
Ne
AfC2
OmC
Lk
Me

MUSKINGUM COUNTY, OHIO — SHEET NUMBER 74


74
N
R. 12 W. | R. 11 W.
(Joins sheet 67)
(Joins sheet 73)
(Joins sheet 75)
(Joins sheet 80)
2 210 000 FEET
2 195 000 FEET
675 000 FEET
655 000 FEET
T. 13 N.
T. 12 N.
5 000 Feet
1 Kilometer
Scale - 1:15 840
SALT CREEK
RICH HILL
ROCK
KENT RUN
MEIGS
BUEL
High Hill
Kent Run
Starrett Creek
water
284
1
4
5
6
7
8
9
33
MsB
MsC
MsD
MsE
LpD2
LpC2
LrE2
GtC2
GtD2
CrC
FaB
WmC2
WmB
WuE2
ZnB
Ne
Lm
AcB
LrF
BkF
GdC2
RfC
w

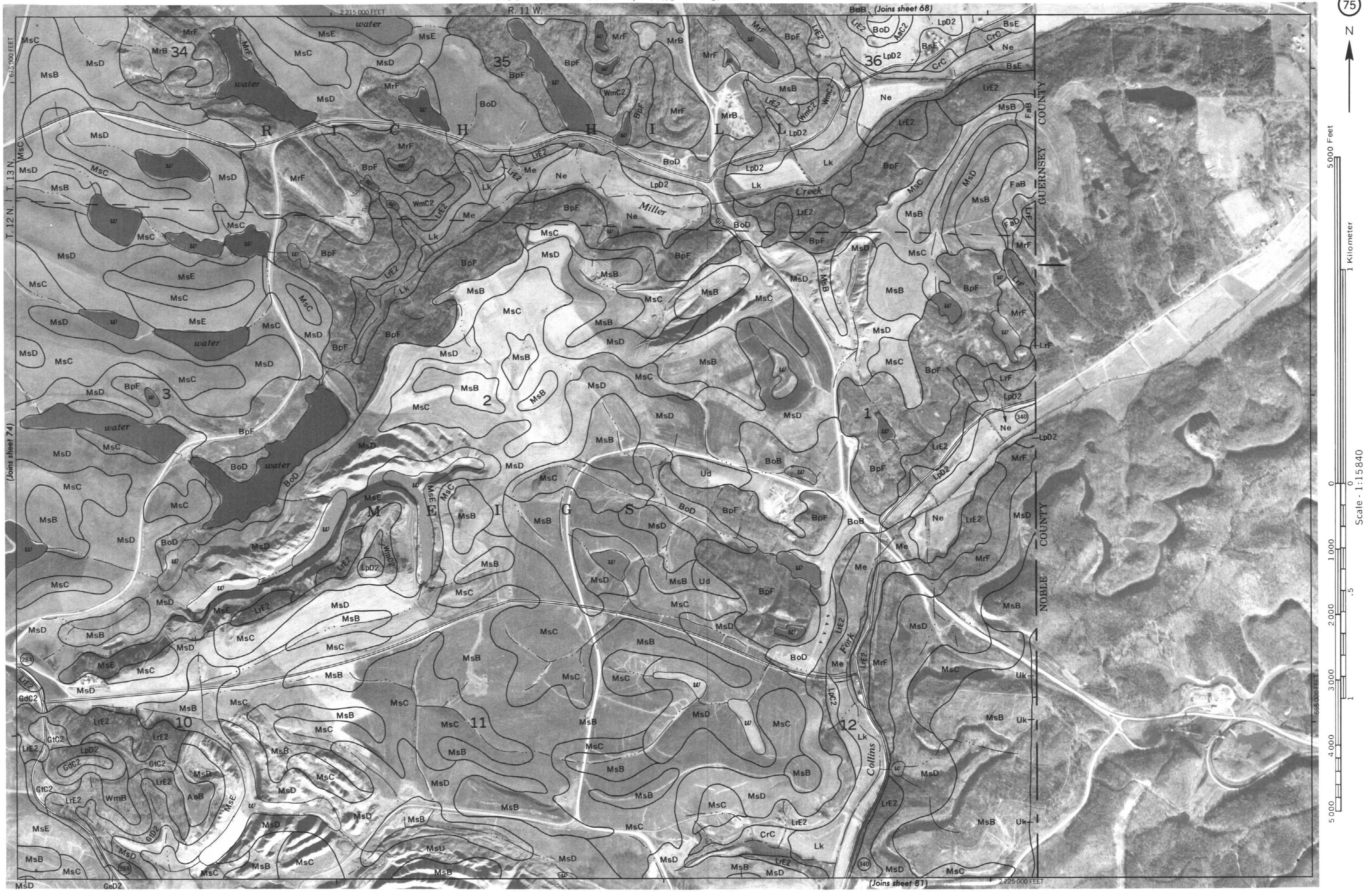
MUSKINGUM COUNTY, OHIO NO. 74

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MUSKINGUM COUNTY, OHIO — SHEET NUMBER 75

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MUSKINGUM COUNTY, OHIO NO. 75


(Joins sheet 68)
(Joins sheet 74)
(Joins sheet 81)
2 215 000 FEET
2 225 000 FEET
675 000 FEET
655 000 FEET
R. 11 W.
T. 13 N.
T. 12 N.
R I C H H I L L
M E I G S
GUERNSEY COUNTY
NOBLE COUNTY
Miller
Creek
Collins
Fork
34
35
36
1
2
3
10
11
12
284
340
water
w
MsC
MsB
MsD
MsE
MrF
MrB
BpF
BoD
BoB
LrE2
LrF
LpD2
LpC2
Lk
Ne
Me
WmC2
WmB
AaC2
AaB
BsE
CrC
FaB
FaD
Ud
Uk
GdC2
GtC2
GtD2
GeD2
N
5000 Feet
1 Kilometer
Scale 1:15840
0
1000
2000
3000
4000
5000
.5
1

76

MUSKINGUM COUNTY, OHIO — SHEET NUMBER 76

N

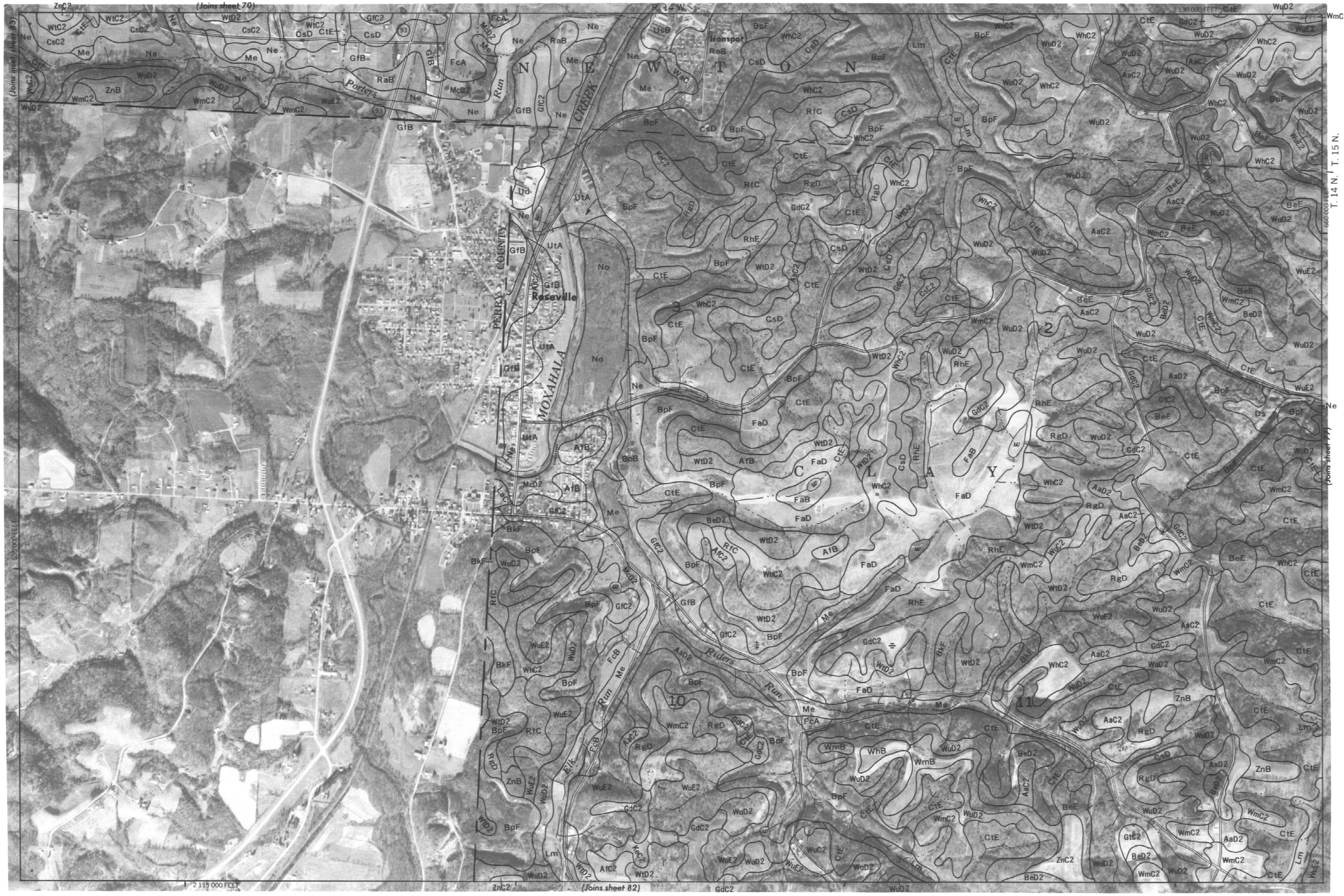
5 000 Feet

1 Kilometer

Scale - 1:15 840

0 1000 2000 3000 4000 5000

0 .5 1



(Joins sheet 70)
(Joins inset, sheet 83)
(Joins sheet 82)
(Joins sheet 77)
R. 14 W.
T. 14 N.
T. 15 N.
2 130 000 FEET
2 115 000 FEET
660 000 FEET
650 000 FEET
NEWTON
CLAY
PERRY COUNTY
MOXAHALA CREEK
Porters Run
Riders Run
Elk Run
Roseville
Ironspot
2
3
10
11

MUSKINGUM COUNTY, OHIO NO. 76

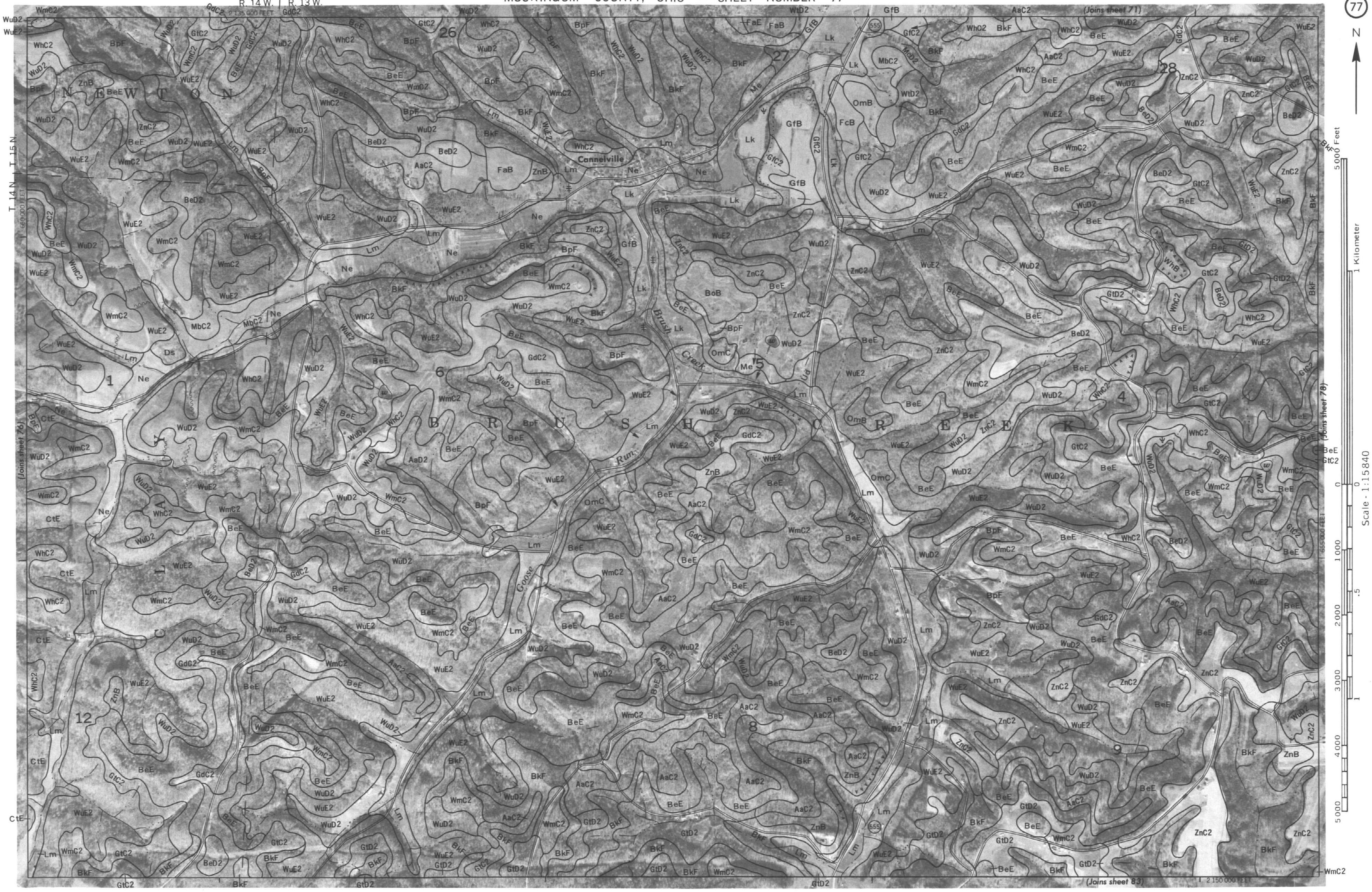
This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MUSKINGUM COUNTY, OHIO — SHEET NUMBER 77

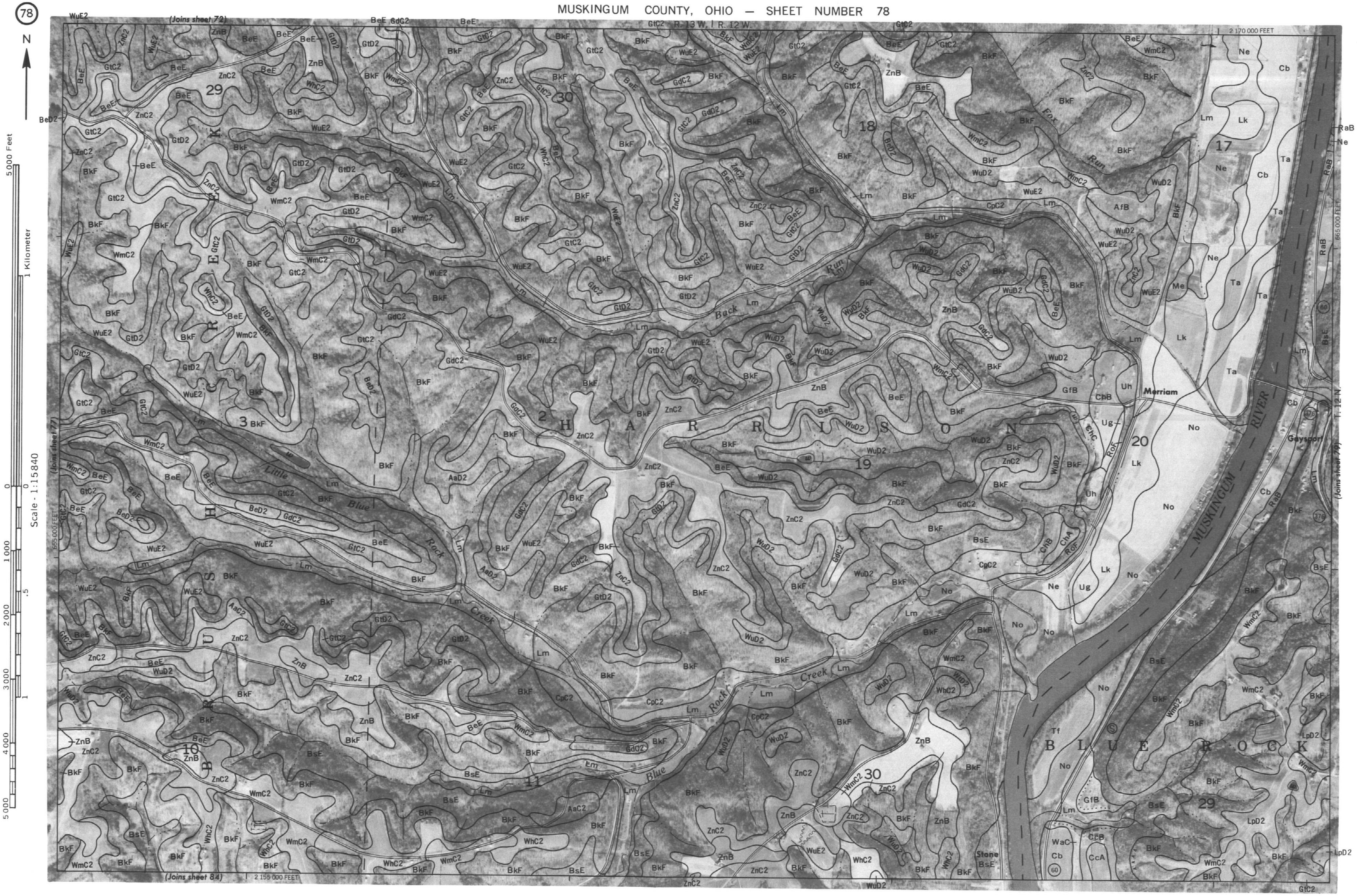
77

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MUSKINGUM COUNTY, OHIO NO. 77

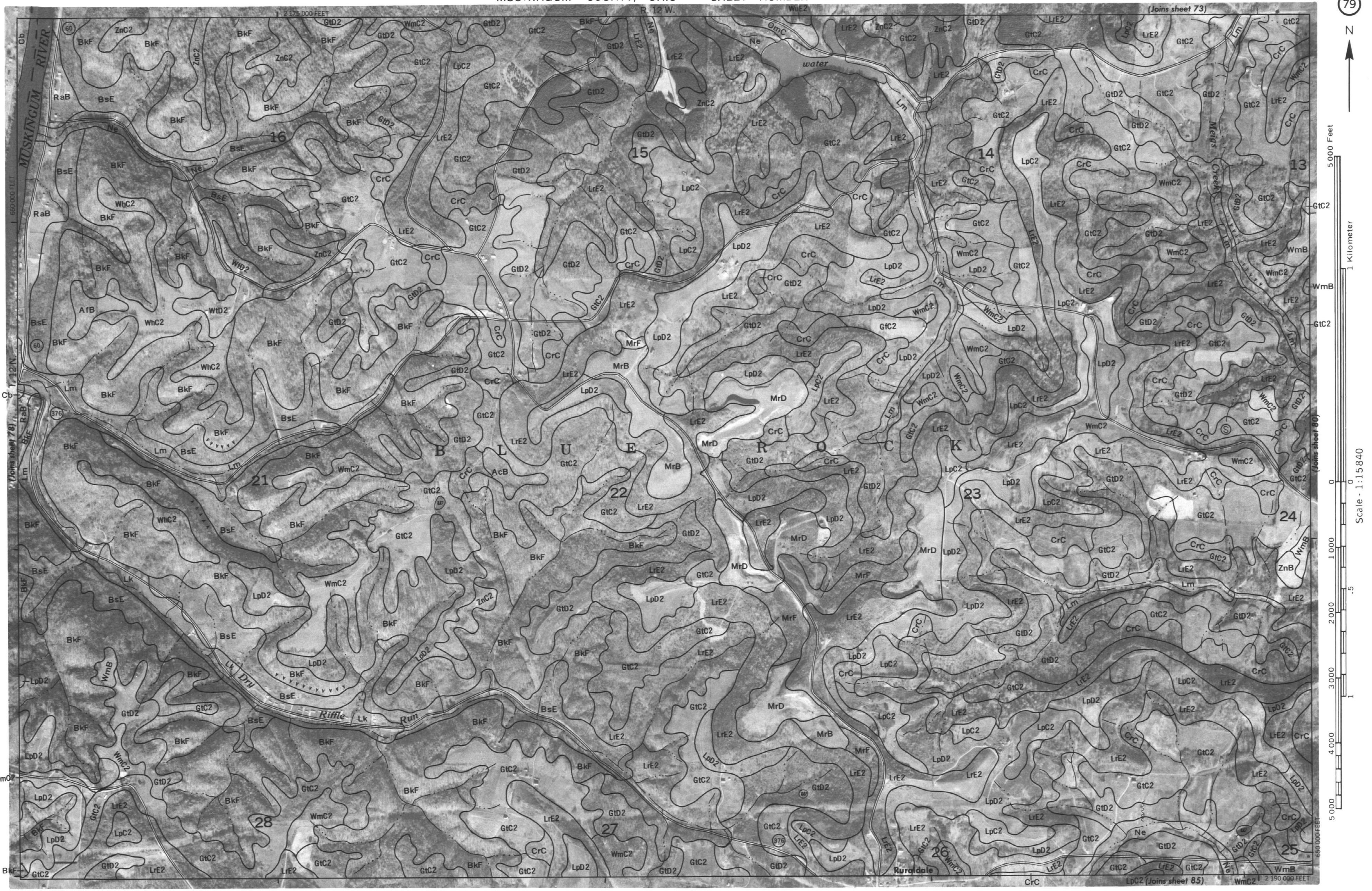

R. 14 W. | R. 13 W.
2 135 000 FEET
(Joins sheet 71)
(Joins sheet 76)
(Joins sheet 78)
(Joins sheet 83)
T. 14 N. | T. 15 N.
660 000 FEET
655 000 FEET
2 150 000 FEET
N
NEWTON
CLAY
BRUSH CREEK
Cannelville
Brush Creek
Goose Run
555
26
27
28
1
4
5
6
7
8
9
12
5000 Feet
1 Kilometer
Scale - 1:15840
0
1000
2000
3000
4000
5000
.5
1
WuD2
WuE2
WmC2
WhC2
BeE
BeD2
BpF
BkF
GdC2
GtC2
GtD2
GfB
Lm
Lk
Ne
Me
MbC2
Ds
CtE
ZnB
ZnC2
AaC2
AaD2
FaB
FaE
FcB
OmB
OmC
BoB
WhB
Ud

MUSKINGUM COUNTY, OHIO — SHEET NUMBER 78


78
N
5 000 Feet
1 Kilometer
Scale - 1:15840
0
1000
2000
3000
4000
5 000
.5
1
(Joins sheet 72)
(Joins sheet 77)
(Joins sheet 79)
(Joins sheet 84)
R. 13 W. | R. 12 W.
T. 12 N.
2 170 000 FEET
2 155 000 FEET
665 000 FEET
H A R R I S O N
B L U E R O C K
H E C K
B R U S H
Merriam
Gaysport
Stone
MUSKINGUM RIVER
Fox Run
Back Run
Little Blue Rock
Blue Rock Creek
29
30
18
17
3
2
19
20
10
11
30
29
60
376

MUSKINGUM COUNTY, OHIO NO. 78

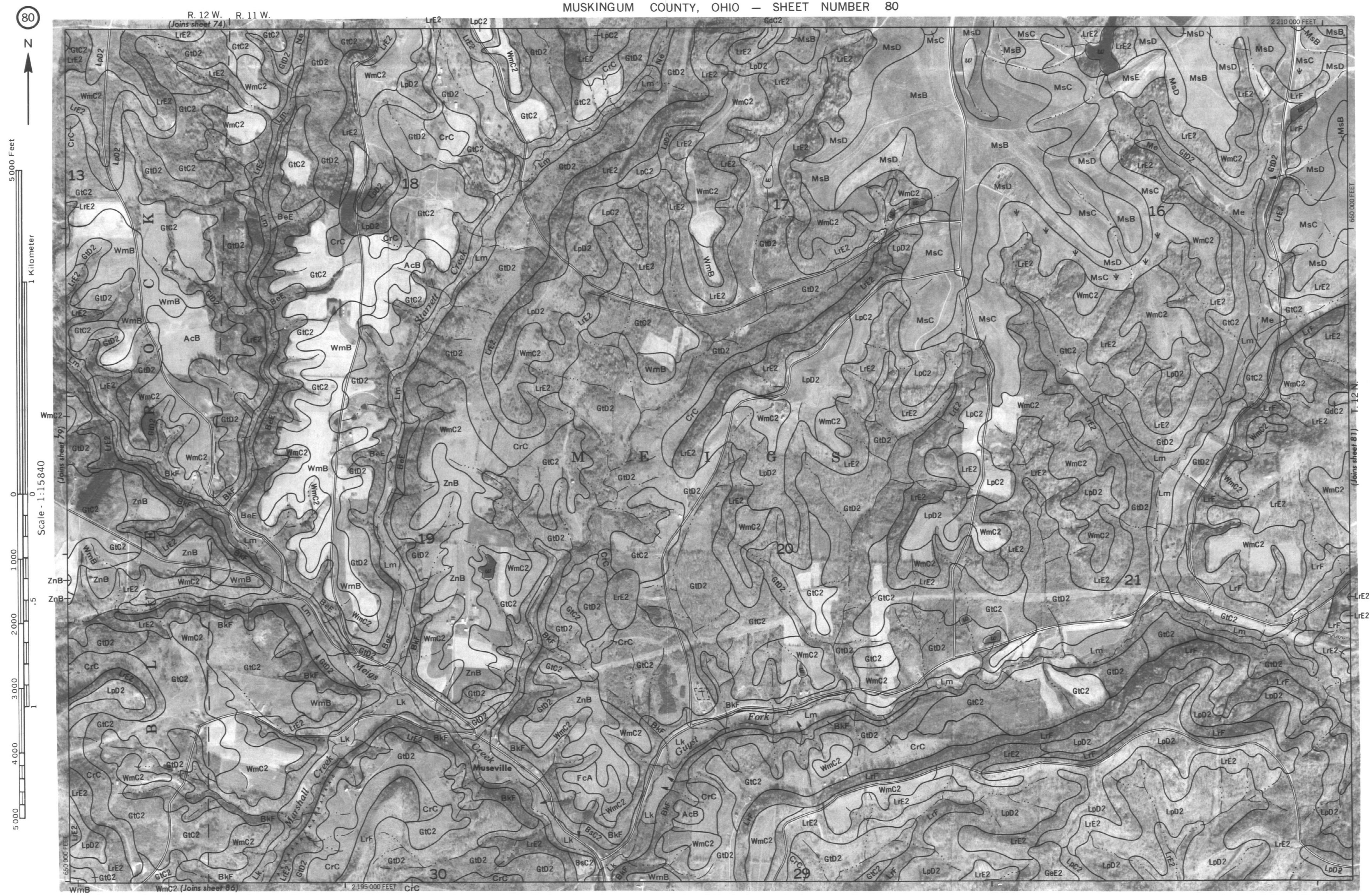
This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.


(Joins sheet 73)
(Joins sheet 78)
(Joins sheet 80)
(Joins sheet 85)
MUSKINGUM — RIVER
R. 12 W.
T. 12 N.
2 175 000 FEET
2 190 000 FEET
660 000 FEET
650 000 FEET
B L U E R O C K
Dry Riffle Run
Meigs Creek
water
Ruraldale
13
14
15
16
21
22
23
24
25
26
27
28
60
376
N
5000 Feet
1 Kilometer
Scale 1:15840
0
1000
2000
3000
4000
5000
.5
1

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MUSKINGUM COUNTY, OHIO NO. 79

MUSKINGUM COUNTY, OHIO — SHEET NUMBER 80

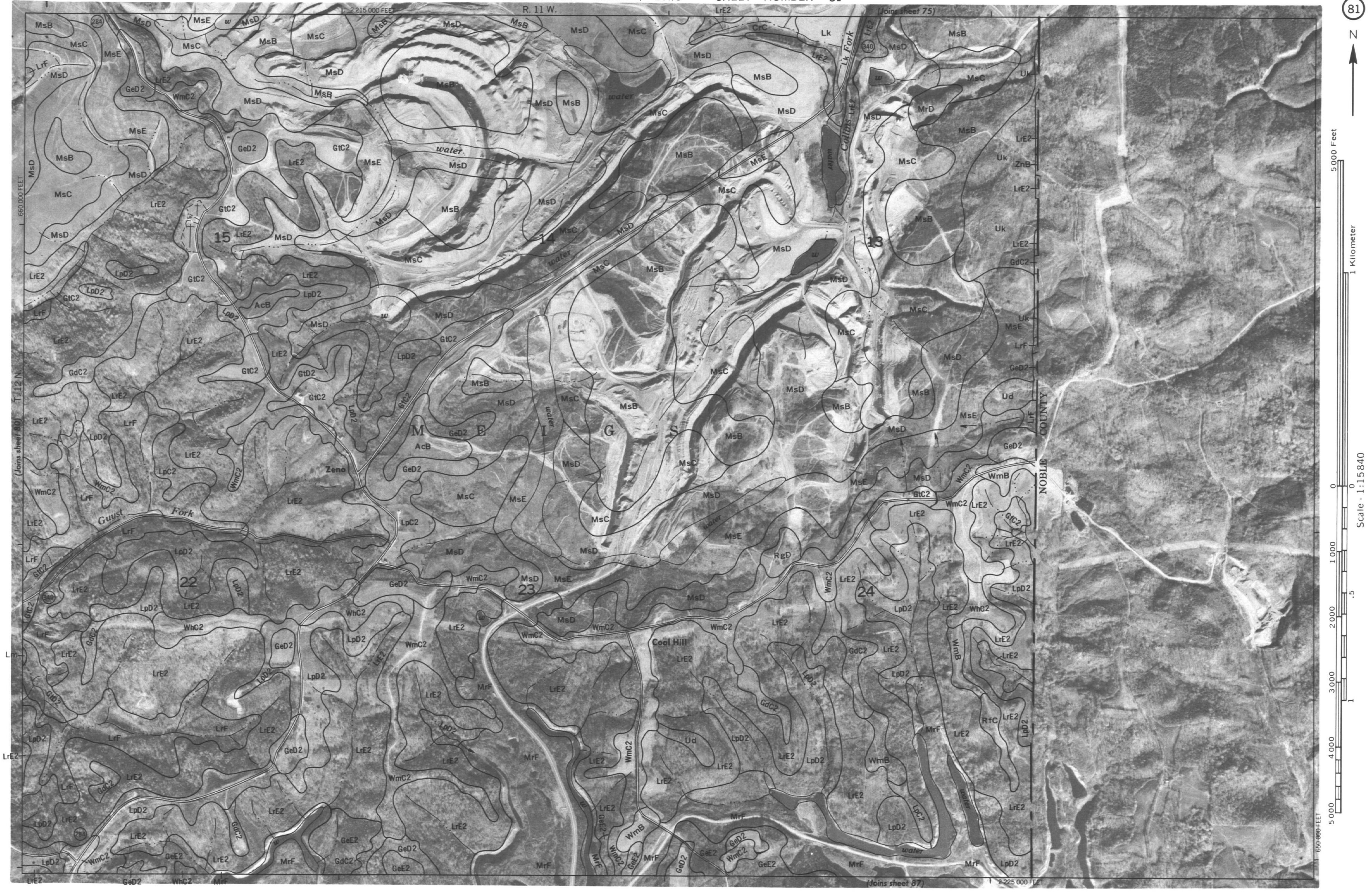


80
N
R. 12 W.
R. 11 W.
(Joins sheet 74)
(Joins sheet 79)
(Joins sheet 81)
WmC2 (Joins sheet 86)
T. 12 N.
2 210 000 FEET
2 195 000 FEET
650 000 FEET
5000 Feet
1 Kilometer
Scale 1:15840
0
1000
2000
3000
4000
5 000
.5
1
Feet
B L A C K
M E I G S
13
16
17
18
19
20
21
29
30
Starrett Creek
Meigs Creek
Marshall Creek
Buffalo Fork
Museville

MUSKINGUM COUNTY, OHIO NO. 80

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MUSKINGUM COUNTY, OHIO — SHEET NUMBER 81

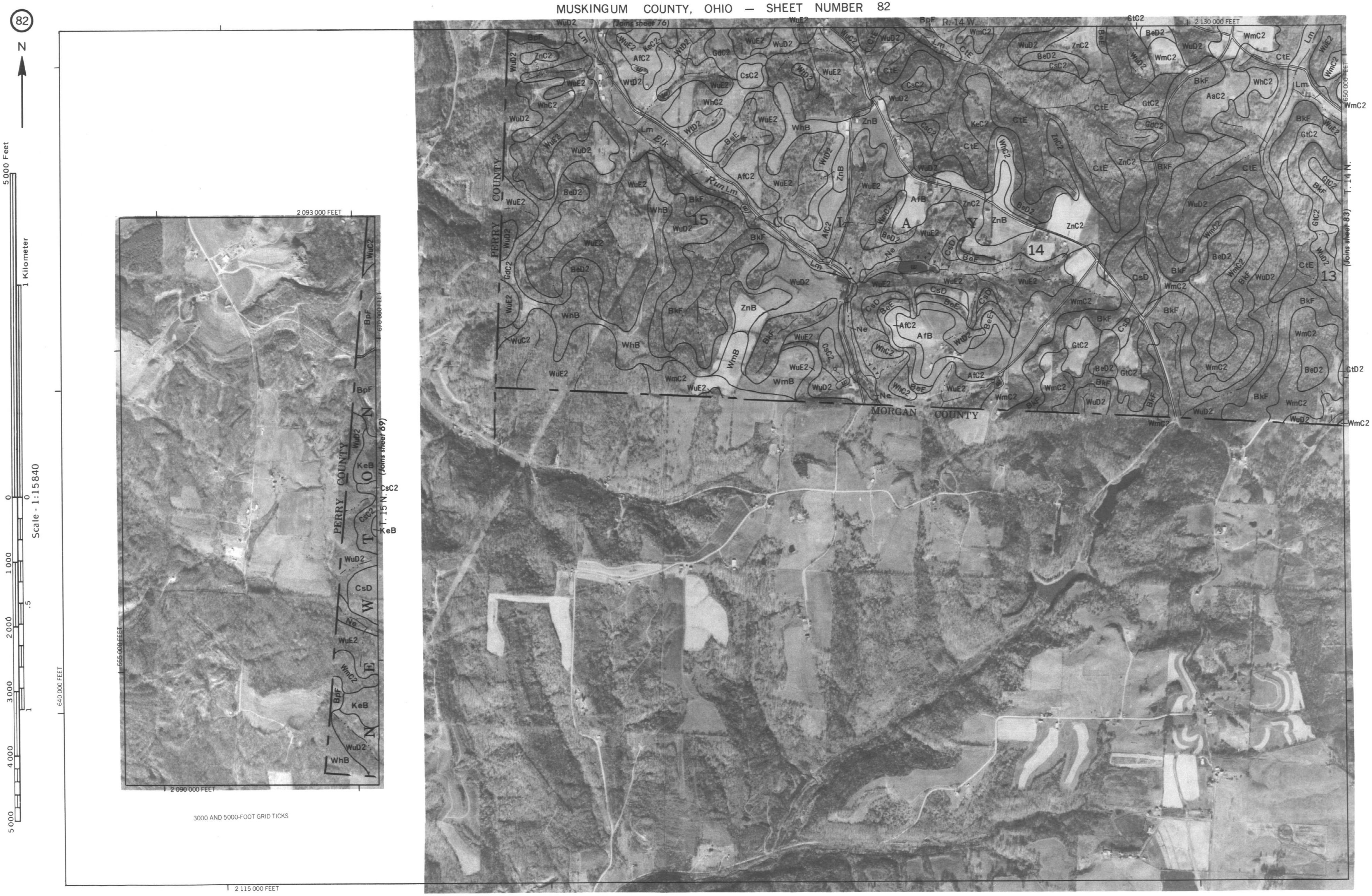


81
N
R. 11 W.
T. 12 N.
2 215 000 FEET
2 225 000 FEET
660 000 FEET
650 000 FEET
(Joins sheet 75)
(Joins sheet 80)
(Joins sheet 87)
NOBLE COUNTY
M E I G S
Zeno
Coal Hill
Guyst Fork
Lk Fork
Collins Fork
water
w
13
14
15
22
23
24
284
340
MsB
MsC
MsD
MsE
LrE2
LrF
GeD2
GtC2
GdC2
LpD2
LpC2
WmC2
WhC2
WmB
AcB
MrD
MrF
CrC
Lk
Uk
Ud
ZnB
RgD
RfC
GeE2
Lm
5 000 Feet
1 Kilometer
Scale 1:15840
0
1 000
2 000
3 000
4 000
5 000
.5
1

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MUSKINGUM COUNTY, OHIO NO. 81

MUSKINGUM COUNTY, OHIO — SHEET NUMBER 82

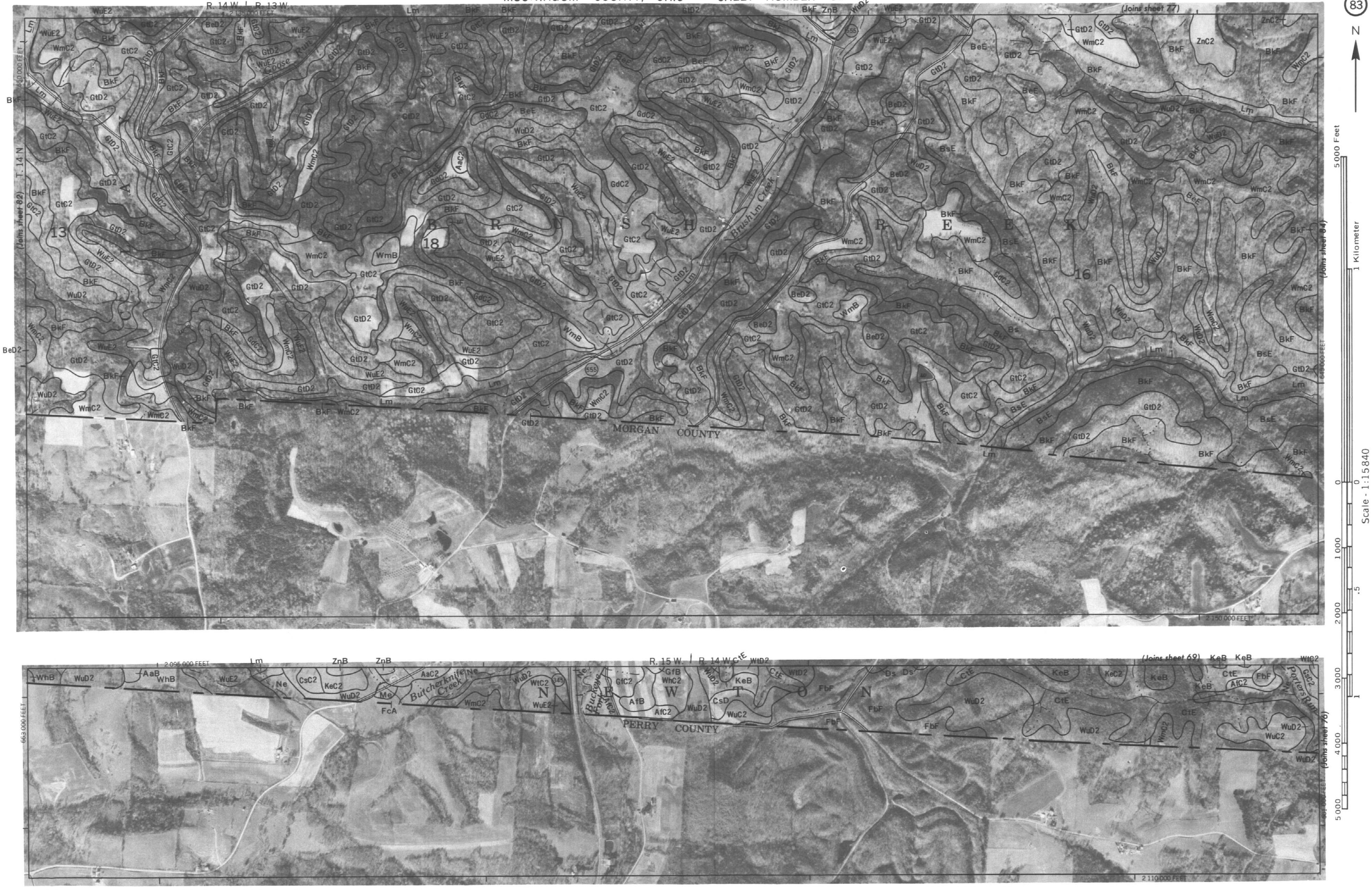


82
N
5 000 Feet
1 Kilometer
Scale - 1:15840
0
1 000
2 000
3 000
4 000
5 000
0
.5
1
(Joins sheet 76)
(Joins sheet 83)
(Joins sheet 69)
R. 14 W.
T. 14 N.
T. 15 N.
2 130 000 FEET
650 000 FEET
2 093 000 FEET
670 000 FEET
665 000 FEET
2 090 000 FEET
640 000 FEET
2 115 000 FEET
3000 AND 5000-FOOT GRID TICKS
PERRY COUNTY
MORGAN COUNTY
CLAY
15
14
13
Elk Run
HARRISON
WuD2
BpF
ZnC2
WuE2
AfC2
WtD2
GdC2
CsC2
WhC2
WmC2
Lm
CtE
BeD2
GtC2
AaC2
BkF
KeC2
ZnB
WhB
AfB
Ne
CsD
BeE
WmB
GtD2
KeB
WuC2
ZnC2

MUSKINGUM COUNTY, OHIO NO. 82

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MUSKINGUM COUNTY, OHIO — SHEET NUMBER 83

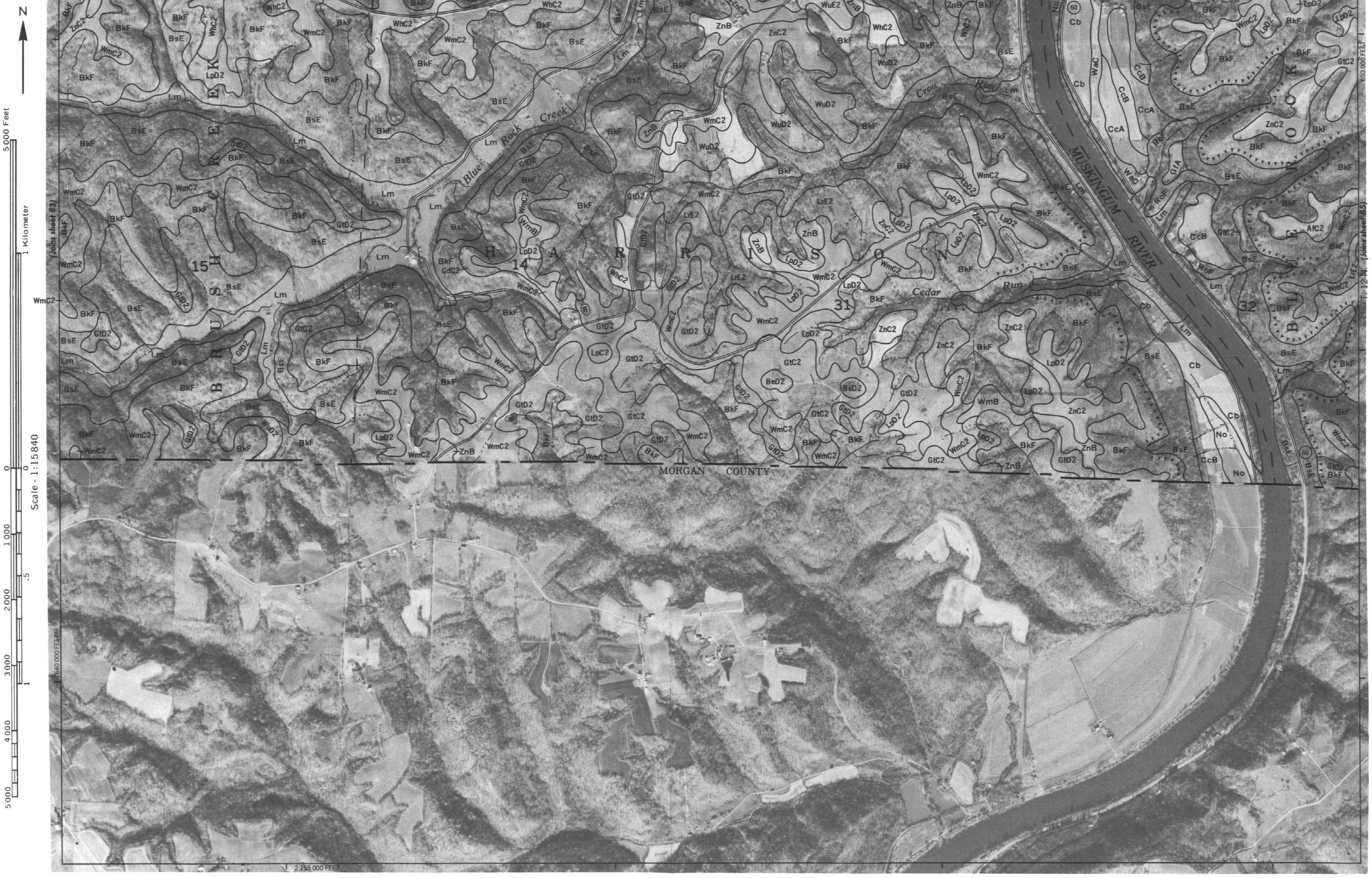

83
N
R. 14 W. | R. 13 W.
2 135 000 FEET
T. 14 N.
650 000 FEET
(Joins sheet 77)
(Joins sheet 82)
(Joins sheet 84)
Goose Run
Brush Creek
B R U S H C R E E K
13
18
17
16
555
MORGAN COUNTY
2 150 000 FEET
R. 15 W. | R. 14 W.
2 095 000 FEET
663 000 FEET
(Joins sheet 69)
(Joins sheet 76)
Butcherknife Creek
Buckeye Fork
Porters Run
345
N E W T O N
PERRY COUNTY
2 110 000 FEET
5 000 Feet
1 Kilometer
0
1 000
2 000
3 000
4 000
5 000
.5
1
Scale - 1:15840

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MUSKINGUM COUNTY, OHIO NO. 83

(84)

MUSKINGUM COUNTY, OHIO — SHEET NUMBER 84

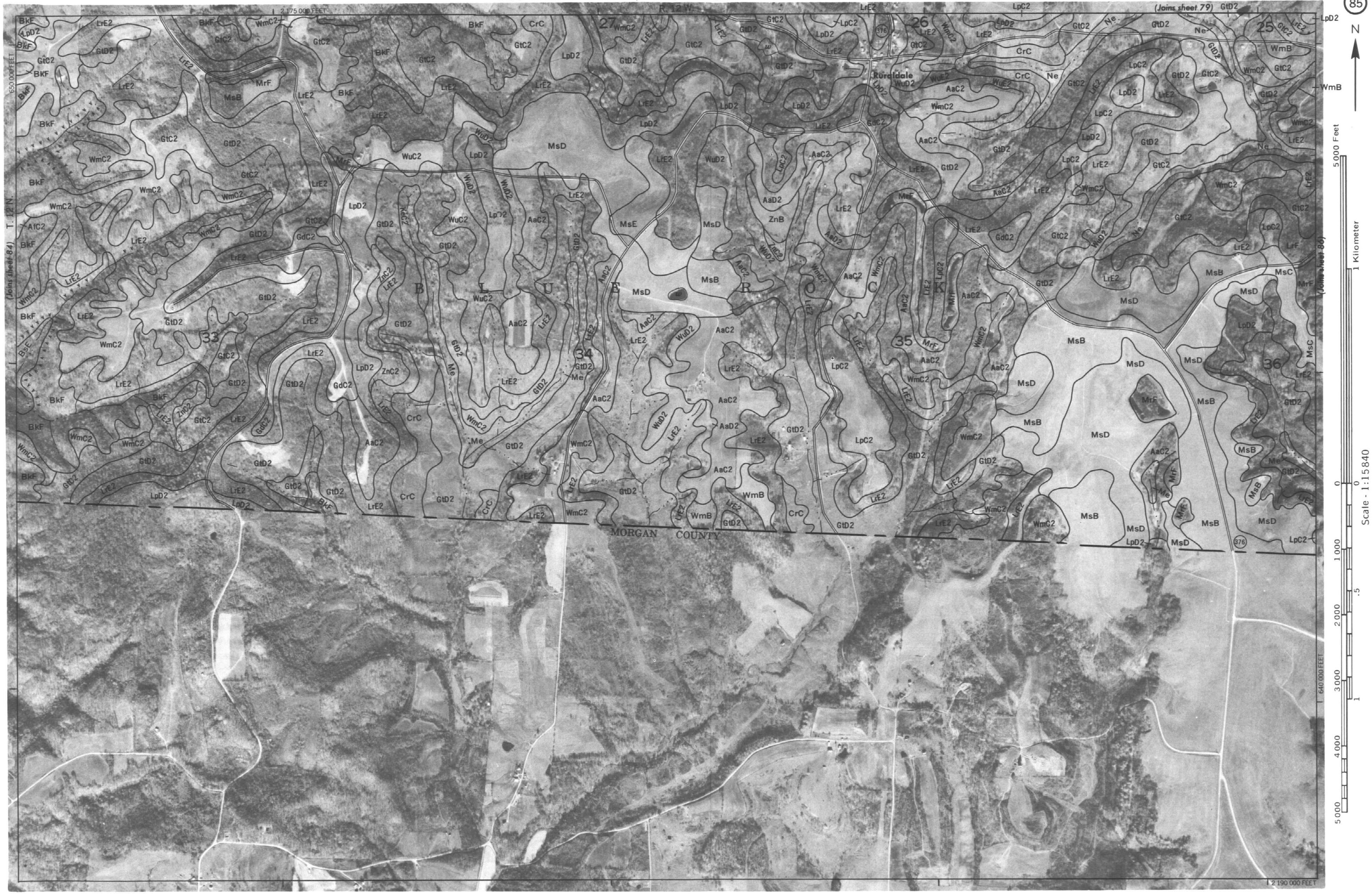

N
5000 Feet
1 Kilometer
Scale - 1:15840
0
1000
2000
3000
4000
5000
0
.5
1
(Joins sheet 78)
(Joins sheet 83)
(Joins sheet 85)
R. 13 W.
R. 12 W.
T. 12 N.
2 170 000 FEET
650 000 FEET
640 000 FEET
2 155 000 FEET
BRUSH CREEK
HARRISON
BLUE ROCK
Blue Rock Creek
Crow Run
Cedar Run
MUSKINGUM RIVER
MORGAN COUNTY
15
14
31
32
60

MUSKINGUM COUNTY, OHIO NO. 84

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MUSKINGUM COUNTY, OHIO — SHEET NUMBER 85

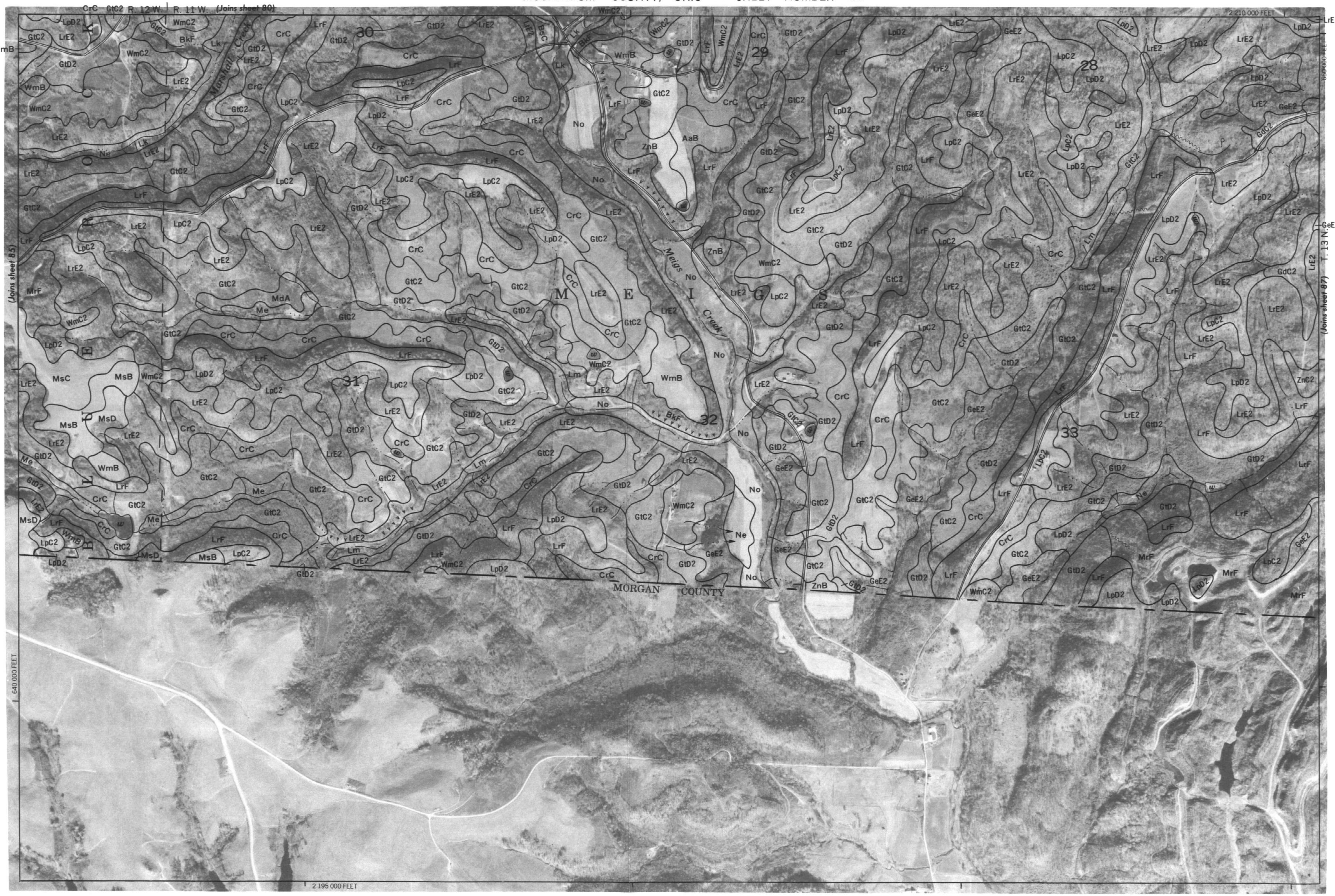
85


2 175 000 FEET
650 000 FEET
R. 12 W.
T. 12 N.
(Joins sheet 79)
(Joins sheet 84)
(Joins sheet 86)
27
26
25
33
34
35
36
B L U E R O C K
Ruraldale
376
MORGAN COUNTY
640 000 FEET
2 190 000 FEET
N
BkF
LpD2
GtC2
GtD2
LrE2
WmC2
MsB
MrF
CrC
LpC2
Ne
WmB
AaC2
WuC2
WuD2
LpD2
MsD
MsE
MsB
ZnB
AaD2
GdC2
ZnC2
Me
LrF
MsC
AfC2
BsE
5 000 Feet
1 Kilometer
Scale - 1:15 840
0
1 000
2 000
3 000
4 000
5 000
.5
1

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MUSKINGUM COUNTY, OHIO NO. 85

MUSKINGUM COUNTY, OHIO — SHEET NUMBER 86


N
R. 12 W.
R. 11 W.
(Joins sheet 80)
(Joins sheet 85)
(Joins sheet 87)
T. 13 N.
2 210 000 FEET
650 000 FEET
640 000 FEET
2 195 000 FEET
MEIGS
OLIVE GREEN?
Marshall Creek
Meigs Creek
MORGAN COUNTY
28
29
30
31
32
33
GtD2
LrE2
LrF
CrC
GtC2
LpC2
LpD2
WmC2
WmB
BkF
No
ZnB
AaB
Lk
Lm
Ne
Me
MsB
MsC
MsD
MdA
MrF
MrF
GeE2
GdC2
ZnC2
BsC

5 000 Feet

1 Kilometer

Scale - 1:15 840

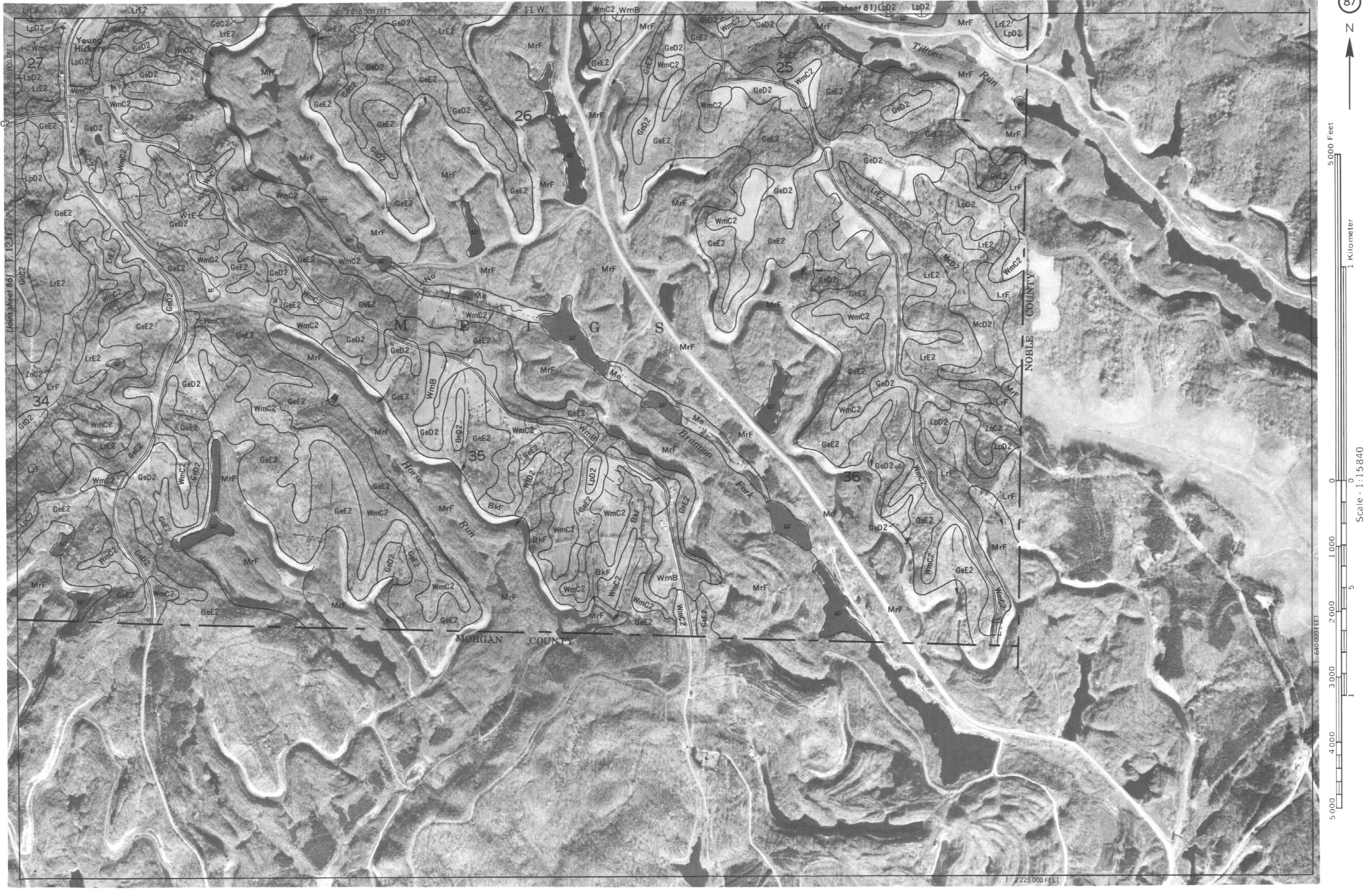
0 1 000 2 000 3 000 4 000 5 000

0 .5 1

MUSKINGUM COUNTY, OHIO NO. 86

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MUSKINGUM COUNTY, OHIO — SHEET NUMBER 87


R. 11 W.
2 225 000 FEET
(Joins sheet 81)
LpD2
LrE2
GdC2
Young Hickory
WmC2
27
LpD2
GeD2
WhC2
GeE2
GdC2
(Joins sheet 86)
T. 12 N.
550 000 FEET
MrF
GeE2
26
w
WmB
25
Tiltons Run
WtE
GeD2
WmC2
No
Me
M E I G S
NOBLE COUNTY
McD2
LrF
LrE2
ZnC2
34
GeE2
WmB
35
Horse Run
BkF
WhD2
LpD2
Me
Branion Fork
36
MrF
ZnC2
LpD2
MORGAN COUNTY
640 000 FEET
2 225 000 FEET
N
5 000 Feet
1 Kilometer
0
Scale - 1:15840
0
1 000
2 000
3 000
4 000
5 000
0
5
1

This soil survey map was compiled by the U. S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MUSKINGUM COUNTY, OHIO NO. 87